```
=> d his ful

     (FILE 'HOME' ENTERED AT 15:29:34 ON 01 SEP 2009)

     FILE 'HCAPLUS' ENTERED AT 15:30:31 ON 01 SEP 2009
L1             1 SEA SPE=ON  ABB=ON  PLU=ON  US20070054187/PN
                 D L1 ALL
                 SAV L1 LAN032/A


     FILE 'REGISTRY' ENTERED AT 15:32:43 ON 01 SEP 2009
L2         24363 SEA SPE=ON  ABB=ON  PLU=ON  LI (L) (FE OR MN OR CO OR
                 NI)/ELS
L3          2038 SEA SPE=ON  ABB=ON  PLU=ON  L2 (L) P/ELS
L4          1848 SEA SPE=ON  ABB=ON  PLU=ON  L3 (L) O/ELS


     FILE 'REGISTRY' ENTERED AT 15:36:02 ON 01 SEP 2009
                 E PHOSPHORIC ACID/CN
L5             1 SEA SPE=ON  ABB=ON  PLU=ON  "PHOSPHORIC ACID"/CN
                 E HYDROGEN PHOPHATE/CN
                 E HYDROGEN PHOSPHATE/CN
L6             1 SEA SPE=ON  ABB=ON  PLU=ON  "HYDROGEN PHOSPHATE"/CN
                 E DIHYDROGEN PHOSPHATE/CN
L7             1 SEA SPE=ON  ABB=ON  PLU=ON  "DIHYDROGEN PHOSPHATE"/CN

     FILE 'HCAPLUS' ENTERED AT 15:36:52 ON 01 SEP 2009
L8         84515 SEA SPE=ON  ABB=ON  PLU=ON  (L5 OR L6 OR L7)
L9         11172 SEA SPE=ON  ABB=ON  PLU=ON  METAL? (2W) ?PHOSPHATE?
L10        94376 SEA SPE=ON  ABB=ON  PLU=ON  L8 OR L9
L11         3046 SEA SPE=ON  ABB=ON  PLU=ON  L4
L12          420 SEA SPE=ON  ABB=ON  PLU=ON  L11 AND L10
                 D L12 3-5 KWIC
L13        770332 SEA SPE=ON  ABB=ON  PLU=ON  ELECTRODE#
L14           127 SEA SPE=ON  ABB=ON  PLU=ON  L12 AND L13
L15        175813 SEA SPE=ON  ABB=ON  PLU=ON  BATTERY# OR BATTERIES#
L16           124 SEA SPE=ON  ABB=ON  PLU=ON  L15 AND L14
L17         89506 SEA SPE=ON  ABB=ON  PLU=ON  HYDROTHERMAL?
L18            11 SEA SPE=ON  ABB=ON  PLU=ON  L16 AND L17
L19           133 SEA SPE=ON  ABB=ON  PLU=ON  L11 AND L17


     FILE 'REGISTRY' ENTERED AT 15:43:18 ON 01 SEP 2009
L20            2 SEA SPE=ON  ABB=ON  PLU=ON  554-13-2 OR  1310-65-2
```

```
     FILE 'HCAPLUS' ENTERED AT 15:43:35 ON 01 SEP 2009
L21       20791 SEA SPE=ON  ABB=ON  PLU=ON  L20
L22         533 SEA SPE=ON  ABB=ON  PLU=ON  L21 AND L11
                D L22 2-3 KWIC
L23         122 SEA SPE=ON  ABB=ON  PLU=ON  L22 AND L13
L24          10 SEA SPE=ON  ABB=ON  PLU=ON  L23 AND L17
L25           2 SEA SPE=ON  ABB=ON  PLU=ON  L24 NOT L18
L26         116 SEA SPE=ON  ABB=ON  PLU=ON  L23 AND L15
L27        1421 SEA SPE=ON  ABB=ON  PLU=ON  PYROL? (3A) (SUGAR# OR
                CELLULOSE#)
L28           5 SEA SPE=ON  ABB=ON  PLU=ON  L27 AND L11
L29       86777 SEA SPE=ON  ABB=ON  PLU=ON  CARBON# (2A) (FIBER# OR
                FIBRE#)
L30         107 SEA SPE=ON  ABB=ON  PLU=ON  L29 AND L11
L31           5 SEA SPE=ON  ABB=ON  PLU=ON  L30 AND L17
L32          20 SEA SPE=ON  ABB=ON  PLU=ON  L31 OR L28 OR L24 OR L18

     FILE 'ZCAPLUS' ENTERED AT 15:51:03 ON 01 SEP 2009


     FILE HOME

     FILE HCAPLUS

     Copyright of the articles to which records in this database refer is
     held by the publishers listed in the PUBLISHER (PB) field (available
     for records published or updated in Chemical Abstracts after Decembe
     26, 1996), unless otherwise indicated in the original publications.
     The CA Lexicon is the copyrighted intellectual property of the
     American Chemical Society and is provided to assist you in searching
     databases on STN.  Any dissemination, distribution, copying, or stor
     of this information, without the prior written consent of CAS, is
     strictly prohibited.

     FILE COVERS 1907 - 1 Sep 2009  VOL 151 ISS 10
     FILE LAST UPDATED: 31 Aug 2009  (20090831/ED)
     REVISED CLASS FIELDS (/NCL) LAST RELOADED:  Jun 2009
     USPTO MANUAL OF CLASSIFICATIONS THESAURUS ISSUE DATE:  Jun 2009

     HCAplus now includes complete International Patent Classification (I
     reclassification data for the third quarter of 2009.

     CAS Information Use Policies apply and are available at:

     http://www.cas.org/legal/infopolicy.html

     This file contains CAS Registry Numbers for easy and accurate
```

substance identification.

The ALL, BIB, MAX, and STD display formats in the CA/CAplus family of databases have been updated to include new citing references information. This enhancement may impact record import into database management software. For additional information, refer to NEWS 9.

FILE ZCAPLUS

FILE COVERS 1907 - 1 Sep 2009 VOL 151 ISS 10
FILE LAST UPDATED: 31 Aug 2009 (20090831/ED)
REVISED CLASS FIELDS (/NCL) LAST RELOADED: Jun 2009
USPTO MANUAL OF CLASSIFICATIONS THESAURUS ISSUE DATE: Jun 2009

ZCAplus now includes complete International Patent Classification (I reclassification data for the third quarter of 2009.

CAS Information Use Policies apply and are available at:

http://www.cas.org/legal/infopolicy.html

This file contains CAS Registry Numbers for easy and accurate substance identification.

The ALL, BIB, MAX, and STD display formats in the CA/CAplus family of databases have been updated to include new citing references information. This enhancement may impact record import into database management software. For additional information, refer to NEWS 9.

FILE REGISTRY
Property values tagged with IC are from the ZIC/VINITI data file provided by InfoChem.

STRUCTURE FILE UPDATES: 31 AUG 2009 HIGHEST RN 1178609-15-8
DICTIONARY FILE UPDATES: 31 AUG 2009 HIGHEST RN 1178609-15-8

New CAS Information Use Policies, enter HELP USAGETERMS for details.

TSCA INFORMATION NOW CURRENT THROUGH June 26, 2009.

Please note that search-term pricing does apply when conducting SmartSELECT searches.

REGISTRY includes numerically searchable data for experimental and predicted properties as well as tags indicating availability of experimental property data in the original document. For informatio on property searching in REGISTRY, refer to:

http://www.cas.org/support/stngen/stndoc/properties.html

=> d l32 1-20 bib abs hitstr hitind
YOU HAVE REQUESTED DATA FROM FILE 'HCAPLUS' - CONTINUE? (Y)/N:y

L32 ANSWER 1 OF 20 HCAPLUS COPYRIGHT 2009 ACS on STN
AN 2009:838496 HCAPLUS Full-text
DN 151:225236
TI Preparation of iron lithium phosphate nano-sized composite microsphere
IN Cao, Yuliang; Yang, Hanxi; Qian, Jiangfeng; Zhou, Min; Ai, Xinping
PA Wuhan University, Peop. Rep. China
SO Faming Zhuanli Shenqing Gongkai Shuomingshu, 12pp.
CODEN: CNXXEV
DT Patent
LA Chinese
FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	CN 101475157	A	20090708	CN 2009-10060604	200901 21

PRAI CN 2009-10060604 20090121

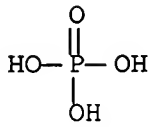
AB The preparation method comprises mixing Li source, Fe source and P source (at a molar ratio of 1-1.05:1:1), **hydrothermal** reaction of the mixture at 100-250° for 1-72h, removing solvent from the **hydrothermal** reaction product to gain the precursor for iron lithium phosphate, adding carbon forming agent into the precursor, heating the mixture in inert or reductive ambient at 500-800°C for 2-48h, and naturally cooling. Ion dopant, nanometer metal, its salt or oxide conductive

agent can be added with the carbon forming agent into the precursor. The dosage of carbon forming agent is 1-30 weight% of total weight of iron lithium phosphate. The dosage of nanometer metal, its salt or oxide conductive agent is 1-10 weight% of total weight of iron lithium phosphate. The doping ratio is 0.05-5 mol% of iron source. The preparation method can also be carried out by mixing Li source, Fe source and P source (at a molar ratio of 1-1.05:1:1), adding reducing agent with or without ion dopant, nanometer metal, salt or oxide conductive agent into the mixture, **hydrothermal** reaction of the mixture at 100-250° for 1-72h, removing solvent from the **hydrothermal** reaction product to gain the precursor for iron lithium phosphate, adding carbon forming agent into the precursor, heating the mixture in inert or reductive ambient at 500-800°C for 2-48h, and naturally cooling. The iron lithium phosphate nano-sized composite microsphere can be prepared by mixing Fe source and P source (at a molar ratio of 1:1), **hydrothermal** reaction of the mixture at 100-250° for 1-72h, adding Li source and carbon forming agent with or without ion dopant, nanometer metal, salt or oxide conductive agent into the mixture, heating the mixture in inert or reductive ambient at 500-800°C for 2-48h, and naturally cooling. The iron lithium phosphate nano-sized composite microsphere can also be prepared by mixing Fe source and P source (at a molar ratio of 1:1), adding carbon forming agent with or without ion dopant, nanometer metal, salt or oxide conductive agent into the mixture, **hydrothermal** reaction of the mixture at 100-250° for 1-72h, adding Li source and carbon forming agent into the **hydrothermal** reaction product, heating the mixture in inert or reductive ambient at 500-800°C for 2-48h, and naturally cooling. The Li source can be one or more of Li carbonate, LiOH, Li acetate, Li2O, LiF, LiCl and LiNO3. The Fe source is one or more of ferrous oxalate, ferrous acetate, ferrous sulfate, ferrous chloride, ferric nitrate, ferric sulfate, etc. The P source is one or more of phosphoric acid, triammonium phosphate, etc. The reducing agent is ascorbic acid, glucose, citric acid, tartaric acid, etc. The carbon forming agent is one or more of glucose, sucrose, starch, polystyrene, phenolic resin, C nanotube, acetylene black, etc. The ion dopant is one or more of Cr3+, Mg2+, Mn2+, Ni2+ and Ti4+. The nanometer metal, salt or oxide conductive agent is one or more of Ag, Ag nitrate, Rh oxide and yttria. The inert or reductive ambient is nitrogen, argon, nitrogen/hydrogen mixture or argon/hydrogen mixture The prepared iron lithium phosphate nano-sized composite microsphere has regular structure, uniformly distributed particle size (2-4μm), compact d. of 1.3-1.6g/cm3, excellent cycle performances and rate capabilities, and the preparation process is simple, easy for control, and low-cost in raw materials.

IT **411234-54-3P**, Iron lithium phosphate
945410-37-7P, Iron lithium magnesium phosphate (Fe0.98LiMg0.02(PO4))

RL: IMF (Industrial manufacture); PRP (Properties); TEM (Technical or engineered material use); PREP (Preparation); USES (Uses)
(preparation of iron lithium phosphate nano-sized composite microsphere)

RN 411234-54-3 HCAPLUS
CN Phosphoric acid, iron lithium salt (9CI) (CA INDEX NAME)



●x Fe(x)

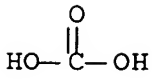
●x Li

RN 945410-37-7 HCAPLUS
CN Iron lithium magnesium phosphate (Fe0.98LiMg0.02(PO4)) (CA INDEX NAME)

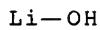
Component	Ratio	Component Registry Number
O4P	1	14265-44-2
Mg	0.02	7439-95-4
Li	1	7439-93-2
Fe	0.98	7439-89-6

IT **554-13-2**, Lithium carbonate **1310-65-2**, Lithium hydroxide **7664-38-2**, Phosphoric acid, reactions
RL: RCT (Reactant); RACT (Reactant or reagent)
(preparation of iron lithium phosphate nano-sized composite microsphere)

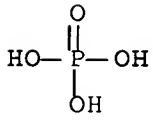
RN 554-13-2 HCAPLUS
CN Carbonic acid, lithium salt (1:2) (CA INDEX NAME)



RN 1310-65-2 HCAPLUS
CN Lithium hydroxide (Li(OH)) (CA INDEX NAME)



RN 7664-38-2 HCAPLUS
CN Phosphoric acid (CA INDEX NAME)



CC 49-5 (Industrial Inorganic Chemicals)
IT **Electrodes**
Secondary **batteries**
(preparation of iron lithium phosphate nano-sized composite microsphere)
IT Carbon black
Carbon fibers
Phenolic resins
Polyanilines
Polyoxyalkylenes
RL: NUU (Other use, unclassified); USES (Uses)
(preparation of iron lithium phosphate nano-sized composite microsphere)
IT **411234-54-3P**, Iron lithium phosphate
945410-37-7P, Iron lithium magnesium phosphate
(Fe0.98LiMg0.02(PO4))

RL: IMF (Industrial manufacture); PRP (Properties); TEM (Technical or engineered material use); PREP (Preparation); USES (Uses)
(preparation of iron lithium phosphate nano-sized composite microsphere)

IT 50-81-7, Ascorbic acid, reactions 77-92-9, Citric acid, reactions 87-69-4, Tartaric acid, reactions 516-03-0, Ferrous oxalate 546-89-4, Lithium acetate **554-13-2**, Lithium carbonate 1309-33-7, Ferric hydroxide 1309-37-1, Ferric oxide, reactions **1310-65-2**, Lithium hydroxide 1333-74-0, Hydrogen, reactions 2944-66-3, Ferric oxalate 3094-87-9, Ferrous acetate 5470-11-1, Hydroxylamine hydrochloride 7447-41-8, Lithium chloride, reactions **7664-38-2**, Phosphoric acid, reactions 7705-08-0, Ferric chloride, reactions 7720-78-7, Ferrous sulfate 7722-76-1, Ammonium dihydrogen phosphate 7758-94-3, Ferrous chloride 7783-28-0, Diammonium hydrogen phosphate 7789-24-4, Lithium fluoride, reactions 7790-69-4, Lithium nitrate 10028-22-5, Ferric sulfate 10045-89-3, Ammonium ferrous sulfate 10361-65-6, Triammonium phosphate 10421-48-4, Ferric nitrate 12057-24-8, Lithium oxide, reactions
RL: RCT (Reactant); RACT (Reactant or reagent)
(preparation of iron lithium phosphate nano-sized composite microsphere)

L32 ANSWER 2 OF 20 HCAPLUS COPYRIGHT 2009 ACS on STN
AN 2009:580387 HCAPLUS Full-text
DN 150:519325
TI Nano graphene platelet-based composite anode compositions for lithium ion batteries
IN Zhamu, Aruna; Jang, Bor Z.
PA USA
SO PCT Int. Appl., 52pp.
CODEN: PIXXD2
DT Patent
LA English
FAN.CNT 2

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI WO 2009061685	A1	20090514	WO 2008-US82183	20081103

W: AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LT, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RS, RU, SC, SD, SE, SG, SK,

SL, SM, ST, SV, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW
RW: AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MT, NL, NO, PL, PT, RO, SE, SI, SK, TR, BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG, BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM

US 20090117467 A1 20090507 US 2007-982672 200711 05

PRAI US 2007-982672 A 20071105

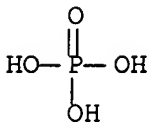
ASSIGNMENT HISTORY FOR US PATENT AVAILABLE IN LSUS DISPLAY FORMAT

AB The present invention provides a nano-scaled graphene platelet-based composite material composition for use as an electrode, particularly as an anode of a lithium ion battery. The composition comprises: (a) micron- or nanometer-scaled particles or coating which are capable of absorbing and desorbing lithium ions; and (b) a plurality of nano-scaled graphene platelets (NGPs), wherein a platelet comprises a graphene sheet or a stack of graphene sheets having a platelet thickness less than 100 nm; wherein at least one of the particles or coating is phys. attached or chemical bonded to at least one of the graphene platelets and the amount of platelets is in the range of 2% to 90% by weight and the amount of particles or coating in the range of 98% to 10% by weight Also provided is a lithium secondary battery comprising such a neg. electrode. The battery exhibits an exceptional specific capacity, an excellent reversible capacity, and a long cycle life.

IT **411234-54-3**
RL: TEM (Technical or engineered material use); USES (Uses)
(nano graphene platelet-based composite anode compns. for lithium ion batteries)

RN 411234-54-3 HCAPLUS

CN Phosphoric acid, iron lithium salt (9CI) (CA INDEX NAME)



●x Fe(x)

●x Li

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 49
IT 9003-35-4DP, pyrolysis product 9003-53-6DP, pyrolysis product
9004-34-6DP, **Cellulose, pyrolysis** product
25014-41-9DP, pyrolysis product 163039-75-6P, Cobalt lithium
nitride (Co0.3Li2.7N) 184912-51-4P, Copper lithium nitride
(Cu0.4Li2.6N) 942906-47-0P 942906-60-7P 942906-61-8P
RL: SPN (Synthetic preparation); TEM (Technical or engineered
material use); PREP (Preparation); USES (Uses)
(nano graphene platelet-based composite anode compns. for lithium
ion batteries)
IT 7429-90-5, Aluminum, uses 7429-90-5D, Aluminum, compds.
7439-89-6D, Iron, compds. 7439-92-1, Lead, uses 7439-92-1D,
Lead, compds. 7440-21-3, Silicon, uses 7440-21-3D, Silicon,
compds. 7440-31-5, Tin, uses 7440-31-5D, Tin, compds.
7440-31-5D, Tin, salt 7440-36-0, Antimony, uses 7440-36-0D,
Antimony, compds. 7440-43-9, Cadmium, uses 7440-43-9D, Cadmium,
compds. 7440-56-4, Germanium, uses 7440-56-4D, Germanium,
compds. 7440-66-6, Zinc, uses 7440-66-6D, Zinc, compds.
7440-69-9, Bismuth, uses 7440-69-9D, Bismuth, compds. 7782-42-5,
Graphite, uses 39300-70-4, Lithium nickel oxide 39311-68-7, Tin
hydroxide 39457-42-6, Lithium manganese oxide 52627-24-4, Cobalt
lithium oxide **411234-54-3** 1042356-59-1, Lithium
vanadium phosphate
RL: TEM (Technical or engineered material use); USES (Uses)
(nano graphene platelet-based composite anode compns. for lithium
ion batteries)
RE.CNT 3 THERE ARE 3 CITED REFERENCES AVAILABLE FOR THIS RECORD
ALL CITATIONS AVAILABLE IN THE RE FORMAT

L32 ANSWER 3 OF 20 HCAPLUS COPYRIGHT 2009 ACS on STN
AN 2009:556229 HCAPLUS Full-text
DN 150:519292
TI Nano graphene platelet-based composite anode compositions for
lithium ion batteries
IN Zhamu, Aruna; Jang, Bor Z.
PA USA
SO U.S. Pat. Appl. Publ., 22pp.
CODEN: USXXCO
DT Patent
LA English
FAN.CNT 2

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE

PI	US 20090117467	A1	20090507	US 2007-982672	200711 05
	WO 2009061685	A1	20090514	WO 2008-US82183	200811 03

W: AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LT, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RS, RU, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW

RW: AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MT, NL, NO, PL, PT, RO, SE, SI, SK, TR, BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG, BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM

PRAI US 2007-982672 A 20071105

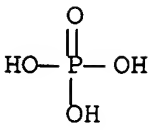
ASSIGNMENT HISTORY FOR US PATENT AVAILABLE IN LSUS DISPLAY FORMAT

AB The present invention provides a nano-scaled graphene platelet-based composite material composition for use as an electrode, particularly as an anode of a lithium ion battery. The composition comprises: (a) micron- or nanometer-scaled particles or coating which are capable of absorbing and desorbing lithium ions; and (b) a plurality of nano-scaled graphene platelets (NGPs), wherein a platelet comprises a graphene sheet or a stack of graphene sheets having a platelet thickness less than 100 nm; wherein at least one of the particles or coating is phys. attached or chemical bonded to at least one of the graphene platelets and the amount of platelets is in the range of 2% to 90% by weight and the amount of particles or coating in the range of 98% to 10% by weight Also provided is a lithium secondary battery comprising such a neg. electrode. The battery exhibits an exceptional specific capacity, an excellent reversible capacity, and a long cycle life.

IT **411234-54-3**, Iron lithium phosphate
RL: TEM (Technical or engineered material use); USES (Uses)
(nano graphene platelet-based composite anode compns. for lithium ion batteries)

RN 411234-54-3 HCAPLUS

CN Phosphoric acid, iron lithium salt (9CI) (CA INDEX NAME)



●x Fe(x)

●x Li

INCL 429231800; 429231950
CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 49
IT 9003-35-4DP, pyrolysis product 9003-53-6DP, Polystyrene, pyrolysis product 9004-34-6DP, Cellulose, pyrolysis product 25014-41-9DP, Polyacrylonitrile, pyrolysis product 163039-75-6P, Cobalt lithium nitride (Co0.3Li2.7N) 184912-51-4P, Copper lithium nitride (Cu0.4Li2.6N) 942906-47-0P 942906-60-7P 942906-61-8P
RL: SPN (Synthetic preparation); TEM (Technical or engineered material use); PREP (Preparation); USES (Uses)
(nano graphene platelet-based composite anode compns. for lithium ion batteries)
IT 7429-90-5, Aluminum, uses 7429-90-5D, Aluminum, compds. 7439-89-6D, Iron, compds. 7439-92-1, Lead, uses 7439-92-1D, Lead, compds. 7440-21-3, Silicon, uses 7440-21-3D, Silicon, compds. 7440-31-5, Tin, uses 7440-31-5D, Tin, compds. 7440-31-5D, Tin, salt 7440-36-0, Antimony, uses 7440-36-0D, Antimony, compds. 7440-43-9, Cadmium, uses 7440-43-9D, Cadmium, compds. 7440-56-4, Germanium, uses 7440-56-4D, Germanium, compds. 7440-66-6, Zinc, uses 7440-66-6D, Zinc, compds. 7440-69-9, Bismuth, uses 7440-69-9D, Bismuth, compds. 7782-42-5, Graphite, uses 39300-70-4, Lithium nickel oxide 39311-68-7, Tin hydroxide 39457-42-6, Lithium manganese oxide 52627-24-4, Cobalt lithium oxide 411234-54-3, Iron lithium phosphate 1042356-59-1, Lithium vanadium phosphate
RL: TEM (Technical or engineered material use); USES (Uses)
(nano graphene platelet-based composite anode compns. for lithium ion batteries)

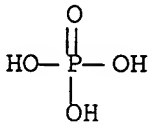
L32 ANSWER 4 OF 20 HCAPLUS COPYRIGHT 2009 ACS on STN
AN 2009:289624 HCAPLUS Full-text

DN 150:356121
TI Method for preparing porous positive **electrode** material for lithium ion **battery**
IN Yao, Yaochun; Dai, Yongnian; Yang, Bin; Liang, Feng; Yi, Huihua; Li, Yongmei; Hu, Chenglin; Yu, Fengjie; Liao, Wenming; Qin, Bo
PA Kunming University of Science and Technology, Peop. Rep. China
SO Faming Zhuanli Shenqing Gongkai Shuomingshu, 6pp.
CODEN: CNXXEV
DT Patent
LA Chinese
FAN.CNT 1

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI CN 101383409	A	20090311	CN 2008-10233465	20081022
PRAI CN 2008-10233465		20081022		

AB The title method comprises the steps of: (1) dissolving a template agent in water, and stirring to completely dissolve and obtain 0.002-0.02mol/L solution, (2) adding 20-25wt.% ammonia water 0.1-2wt.% of the template agent, and uniformly stirring to obtain mixed solution 1, (3) adding an Fe salt until its concentration reaches 0.05-0.5mol/L, stirring for 2-6h, adding an Li salt and a phosphate until both their concns. reach 0.05-0.5mol/L, and stirring for 2-8h to obtain mixed solution 2, (4) transferring into a container, and performing **hydrothermal** crystallization at 60-80°C for 1-7d, (5) evaporating at 80°C until the water content is <5wt.%, and (6) placing in a tubular furnace, heating to 600-800°C in protective atmospheric, sintering at constant temperature for 10-24h, and cooling to room temperature along with the furnace to obtain 300-700nm porous lithium ferric phosphate. The obtained porous pos. **electrode** material has good ion diffusion performance, high conductivity, and good electrochem. properties. The lithium ion **battery** using the porous pos. **electrode** material has long cyclic life.

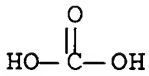
IT **411234-54-3P**, Iron lithium phosphate
RL: IMF (Industrial manufacture); PRP (Properties); TEM (Technical or engineered material use); PREP (Preparation); USES (Uses)
(method for preparing porous pos. **electrode** material for lithium ion **battery**)
RN 411234-54-3 HCAPLUS
CN Phosphoric acid, iron lithium salt (9CI) (CA INDEX NAME)



●x Fe(x)

●x Li

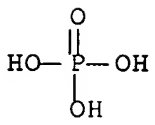
IT 554-13-2, Lithium carbonate 1310-65-2, Lithium hydroxide 7664-38-2, Phosphoric acid, reactions
RL: RCT (Reactant); RACT (Reactant or reagent)
(method for preparing porous pos. **electrode** material for lithium ion **battery**)
RN 554-13-2 HCAPLUS
CN Carbonic acid, lithium salt (1:2) (CA INDEX NAME)



●2 Li

RN 1310-65-2 HCAPLUS
CN Lithium hydroxide (Li(OH)) (CA INDEX NAME)

RN 7664-38-2 HCAPLUS
CN Phosphoric acid (CA INDEX NAME)



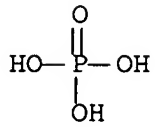
CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
ST manuf porous pos **electrode** material lithium ion **battery**
IT Diffusion
(ionic; method for preparing porous pos. **electrode** material for lithium ion **battery**)
IT Secondary **batteries**
(lithium; method for preparing porous pos. **electrode** material for lithium ion **battery**)
IT Condensation (physical)
Electrodes
Hydrothermal crystallization
(method for preparing porous pos. **electrode** material for lithium ion **battery**)
IT Polyoxyalkylenes, uses
RL: NUU (Other use, unclassified); USES (Uses)
(method for preparing porous pos. **electrode** material for lithium ion **battery**)
IT Phosphates, reactions
RL: RCT (Reactant); RACT (Reactant or reagent)
(method for preparing porous pos. **electrode** material for lithium ion **battery**)
IT **411234-54-3P**, Iron lithium phosphate
RL: IMF (Industrial manufacture); PRP (Properties); TEM (Technical or engineered material use); PREP (Preparation); USES (Uses)
(method for preparing porous pos. **electrode** material for lithium ion **battery**)
IT 57-09-0, Hexadecyltrimethylammonium bromide 1333-74-0, Hydrogen, uses 1336-21-6, Ammonia water 7440-37-1, Argon, uses 9003-11-6 25322-68-3, Polyethylene glycol
RL: NUU (Other use, unclassified); USES (Uses)
(method for preparing porous pos. **electrode** material for lithium ion **battery**)
IT **554-13-2**, Lithium carbonate **1310-65-2**, Lithium hydroxide **7664-38-2**, Phosphoric acid, reactions 7705-08-0, Ferric chloride, reactions 7722-76-1, Ammonium dihydrogen phosphate 7783-28-0, Diammonium hydrogen phosphate 7790-69-4, Lithium nitrate 10028-22-5, Ferric sulfate 10421-48-4, Ferric nitrate 13453-80-0, Lithium dihydrogen

phosphate
RL: RCT (Reactant); RACT (Reactant or reagent)
(method for preparing porous pos. **electrode** material for lithium ion **battery**)

L32 ANSWER 5 OF 20 HCAPLUS COPYRIGHT 2009 ACS on STN
AN 2009:276103 HCAPLUS Full-text
DN 150:502480
TI Improvement of electrochemical and thermal stability of LiFePO4 cathode modified by CeO2
AU Liu, Yan; Mi, Changhuan; Yuan, Changzhou; Zhang, Xiaogang
CS College of Material Science and Engineering, Nanjing University of Aeronautics and Astronautics, Nanjing, Jiangsu, 210016, Peop. Rep. China
SO Journal of Electroanalytical Chemistry (2009), 628(1-2), 73-80
CODEN: JECHES
PB Elsevier B.V.
DT Journal
LA English
AB CeO2-modified LiFePO4 cathode was synthesized by using the triblock copolymer poly(ethylene oxide)-block-poly(propylene oxide)-block-poly(ethane oxide) (P123) as a template. CeO2-modified (2%), 5 weight % CeO2-modified and pristine LiFePO4 powders were characterized by XRD and SEM measurements. The electrochem. behaviors were studied by cyclic voltammetry measurements in Li2SO4 aqueous electrolyte. All compds. undergone Li-ion deintercalation and intercalation upon oxidation and reduction at different scan rates. The electrochem. Li-ion deintercalation-intercalation processes of the CeO2-modified LiFePO4 **electrodes** were improved compare to the pristine LiFePO4 **electrode**, especially at elevated temperature and larger scan rates. Some 2 weight% CeO2-modified material showed better electrochem. performance than that of 5% and pristine materials. A linear relation between the peak current and the square root of scan rate for all peak pairs indicated that the Li+ deintercalation/intercalation processes occurred in all compds. were diffusion-controlled. The DLi+ values of the 2 weight% CeO2-modified LiFePO4 **electrode** is much larger both at room temperature and 40°. The electrochem. impedance spectroscopy tests were carried out before and after CV measurements. The CeO2 modification produced a good elec. contact between oxides, which was in very good agreement with the electrochem. behaviors of **electrodes**. The treatment with CeO2 should improve the comprehensive properties of the cathode materials for Li-ion **batteries** at elevated temperature and larger scan rates.
IT **15365-14-7P**, Iron lithium phosphate (FeLiPO4)
RL: PRP (Properties); SPN (Synthetic preparation); TEM (Technical or engineered material use); PREP (Preparation); USES (Uses)

(**hydrothermal** preparation using P123 template and improvement of electrochem. and thermal stability of LiFePO4 cathode modified by CeO2)

RN 15365-14-7 HCAPLUS
CN Phosphoric acid, iron(2+) lithium salt (1:1:1) (CA INDEX NAME)



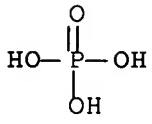
● Fe(II)

● Li

IT 1310-65-2, Lithium hydroxide 7664-38-2, Phosphoric acid, reactions
RL: RCT (Reactant); RACT (Reactant or reagent)
(in **hydrothermal** preparation using P123 template and improvement of electrochem. and thermal stability of LiFePO4 cathode modified by CeO2)

RN 1310-65-2 HCAPLUS
CN Lithium hydroxide (Li(OH)) (CA INDEX NAME)

RN 7664-38-2 HCAPLUS
CN Phosphoric acid (CA INDEX NAME)



CC 72-2 (Electrochemistry)
Section cross-reference(s): 52, 65, 78
IT **Battery** cathodes
(LiFePO4 modified by CeO2)
IT Cathodes
Templates
(**hydrothermal** preparation using P123 template and improvement of electrochem. and thermal stability of LiFePO4 cathode modified by CeO2)
IT 1306-38-3, Ceria, uses
RL: MOA (Modifier or additive use); TEM (Technical or engineered material use); USES (Uses)
(**hydrothermal** preparation using P123 template and improvement of electrochem. and thermal stability of LiFePO4 cathode modified by CeO2)
IT 691397-13-4, Ethylene oxide-propylene oxide triblock copolymer
RL: NUU (Other use, unclassified); USES (Uses)
(**hydrothermal** preparation using P123 template and improvement of electrochem. and thermal stability of LiFePO4 cathode modified by CeO2)
IT **15365-14-7P**, Iron lithium phosphate (FeLiPO4)
RL: PRP (Properties); SPN (Synthetic preparation); TEM (Technical or engineered material use); PREP (Preparation); USES (Uses)
(**hydrothermal** preparation using P123 template and improvement of electrochem. and thermal stability of LiFePO4 cathode modified by CeO2)
IT **1310-65-2**, Lithium hydroxide **7664-38-2**, Phosphoric acid, reactions **7720-78-7**, Ferrous sulfate
RL: RCT (Reactant); RACT (Reactant or reagent)
(in **hydrothermal** preparation using P123 template and improvement of electrochem. and thermal stability of LiFePO4 cathode modified by CeO2)
RE.CNT 42 THERE ARE 42 CITED REFERENCES AVAILABLE FOR THIS RECORD
ALL CITATIONS AVAILABLE IN THE RE FORMAT

L32 ANSWER 6 OF 20 HCAPLUS COPYRIGHT 2009 ACS on STN
AN 2008:1467542 HCAPLUS Full-text
DN 150:59838
TI Lithium-iron phosphate cathode material for secondary lithium **battery** and its modification method
IN Zhang, Weixin; Yang, Zeheng; Wang, Qiang; Wang, Hua
PA Hefei University of Technology, Peop. Rep. China
SO Faming Zhuanli Shenqing Gongkai Shuomingshu, 14pp.
CODEN: CNXXEV
DT Patent

LA Chinese

FAN.CNT 1

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
CN 101315981	A	20081203	CN 2008-10122605	20080616

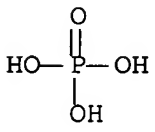
PRAI CN 2008-10122605 20080616

AB The title cathode material is obtained by preparing a lithium iron phosphate as a precursor by **hydrothermal** method, mixing uniformly with a precursor of a conductive material and metal salts, and firing in an inert atmospheric to obtain a cathode material of a lithium iron phosphate doped with metal ions and coated with a conductive material. The inventive method has the advantages of low energy consumption, good chemical uniformity, good conductive property, excellent high-ratio electrochem. performances, and good stability and repeatability in product size, appearance, electrochem. performance, and processibility.

IT **15365-14-7P**, Iron lithium phosphate (FeLiPO4)
RL: IMF (Industrial manufacture); TEM (Technical or engineered material use); PREP (Preparation); USES (Uses)
(method for modifying lithium iron phosphate as cathode materials of secondary lithium **batteries**)

RN 15365-14-7 HCAPLUS

CN Phosphoric acid, iron(2+) lithium salt (1:1:1) (CA INDEX NAME)

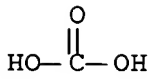


● Fe(II)

● Li

IT **554-13-2**, Lithium carbonate **1310-65-2**, Lithium hydroxide **7664-38-2**, Phosphoric acid, reactions
RL: RCT (Reactant); RACT (Reactant or reagent)
(method for modifying lithium iron phosphate as cathode materials

of secondary lithium **batteries**)
RN 554-13-2 HCAPLUS
CN Carbonic acid, lithium salt (1:2) (CA INDEX NAME)

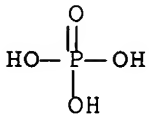


●2 Li

RN 1310-65-2 HCAPLUS
CN Lithium hydroxide (Li(OH)) (CA INDEX NAME)

Li—OH

RN 7664-38-2 HCAPLUS
CN Phosphoric acid (CA INDEX NAME)



CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
ST secondary **battery** cathode lithium iron phosphate pos **electrode** manuf
IT Secondary **batteries**
(lithium; method for modifying lithium iron phosphate as cathode materials of secondary lithium **batteries**)
IT **Battery** cathodes
(method for modifying lithium iron phosphate as cathode materials of secondary lithium **batteries**)
IT Carbonaceous materials (technological products)
RL: IMF (Industrial manufacture); MOA (Modifier or additive use);

PREP (Preparation); USES (Uses)
(method for modifying lithium iron phosphate as cathode materials of secondary lithium **batteries**)

IT Carbon black, processes
RL: PEP (Physical, engineering or chemical process); PROC (Process)
(method for modifying lithium iron phosphate as cathode materials of secondary lithium **batteries**)

IT **15365-14-7P**, Iron lithium phosphate (FeLiPO4)
RL: IMF (Industrial manufacture); TEM (Technical or engineered material use); PREP (Preparation); USES (Uses)
(method for modifying lithium iron phosphate as cathode materials of secondary lithium **batteries**)

IT 142-71-2, Copper acetate 142-72-3, Magnesium acetate 557-34-6, Zinc acetate
RL: MOA (Modifier or additive use); RCT (Reactant); RACT (Reactant or reagent); USES (Uses)
(method for modifying lithium iron phosphate as cathode materials of secondary lithium **batteries**)

IT 516-03-0, Ferrous oxalate 546-89-4, Lithium acetate 553-91-3, Lithium oxalate **554-13-2**, Lithium carbonate **1310-65-2**, Lithium hydroxide 3094-87-9, Ferrous acetate 7447-41-8, Lithium chloride, reactions 7558-79-4, Disodium hydrogen phosphate 7558-80-7, Sodium dihydrogen phosphate 7632-05-5, Sodium phosphate **7664-38-2**, Phosphoric acid, reactions 7705-08-0, Ferric chloride, reactions 7720-78-7, Ferrous sulfate 7722-76-1, Ammonium dihydrogen phosphate 7758-11-4, Dipotassium hydrogen phosphate 7758-94-3, Ferrous chloride 7778-77-0, Potassium dihydrogen phosphate 7783-28-0, Diammonium hydrogen phosphate 10377-48-7, Lithium sulfate 10421-48-4, Ferric nitrate 16068-46-5, Potassium phosphate
RL: RCT (Reactant); RACT (Reactant or reagent)
(method for modifying lithium iron phosphate as cathode materials of secondary lithium **batteries**)

L32 ANSWER 7 OF 20 HCAPLUS COPYRIGHT 2009 ACS on STN
AN 2008:1233242 HCAPLUS Full-text
DN 149:496065
TI Method for low temperature **hydrothermal** synthesis of lithium ferrous phosphate nanomaterial
IN Zhao, Bing; Jiao, Zheng; Wu, Minghong; Yan, Jing; Shi, Wenyan; Wang, Song; Yan, Xiumei; Zhuang, Hua; Tao, Haihua; Zhong, Mingyang
PA Shanghai University, Peop. Rep. China
SO Faming Zhuanli Shenqing Gongkai Shuomingshu, 8pp.
CODEN: CNXXEV
DT Patent
LA Chinese
FAN.CNT 1

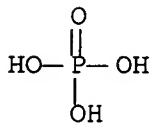
	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	CN 101279727	A	20081008	CN 2008-10037657	200805 20
PRAI	CN 2008-10037657		20080520		

AB The title method comprises dissolving soluble ferrous salt and phosphoric acid or ammonium phosphate salt, adding suitable complexing agent at a complexing agent/Fe2+ molar ratio of (0.1-1):1, adding Li salt at a Li+/Fe2+ molar ratio of (1-2):1 under stirring to obtain precursor solution, ultrasonic-vibrating to obtain uniform solution, adding suitable pH regulator in above solution or in a reaction tank, transferring into a high pressure tank, sealing, performing **hydrothermal** reaction at 120-190° for 5-30 h, opening the reaction tank, taking out, washing, centrifuging to remove unreacted ions and complexing agent, vacuum-drying at 50-80° for 4-8 h, thermally treating at 300-600° for 1-10 h, and naturally cooling to obtain uniform dispersed lithium ferrous phosphate nanomaterial. The invention has the advantages of simple and convenient control, high yield, no pollution of heavy metal, uniform particle size of product, excellent electrochem. properties, etc. The product may be used as **electrode** material of lithium ion **batteries**.

IT 411234-54-3P
RL: PRP (Properties); SPN (Synthetic preparation); TEM (Technical or engineered material use); PREP (Preparation); USES (Uses)
(method for low temperature **hydrothermal** synthesis of lithium ferrous phosphate nanomaterial)

RN 411234-54-3 HCAPLUS

CN Phosphoric acid, iron lithium salt (9CI) (CA INDEX NAME)

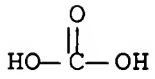


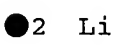
●x Fe(x)

●x Li

IT **554-13-2**, Lithium carbonate **1310-65-2**, Lithium hydroxide **7664-38-2**, Phosphoric acid, reactions
RL: RCT (Reactant); RACT (Reactant or reagent)
(method for low temperature **hydrothermal** synthesis of lithium ferrous phosphate nanomaterial)

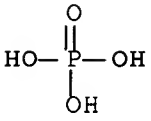
RN 554-13-2 HCAPLUS
CN Carbonic acid, lithium salt (1:2) (CA INDEX NAME)





RN 1310-65-2 HCAPLUS
CN Lithium hydroxide (Li(OH)) (CA INDEX NAME)

RN 7664-38-2 HCAPLUS
CN Phosphoric acid (CA INDEX NAME)



CC 49-5 (Industrial Inorganic Chemicals)
Section cross-reference(s): 52

ST **hydrothermal** synthesis lithium ferrous phosphate nanomaterial ion **battery**

IT Secondary **batteries**
(lithium; method for low temperature **hydrothermal** synthesis of lithium ferrous phosphate nanomaterial)

IT Electric properties
Electrodes
Hydrothermal reaction
Microstructure
Nanostructured materials
Particle size
Particle size distribution
(method for low temperature **hydrothermal** synthesis of lithium ferrous phosphate nanomaterial)

IT Density
(tap; method for low temperature **hydrothermal** synthesis of lithium ferrous phosphate nanomaterial)

IT 57-13-6, Urea, uses 64-17-5, Ethanol, uses 139-33-3, EDTA, disodium salt 1066-33-7, Ammonium bicarbonate
RL: NUU (Other use, unclassified); USES (Uses)
(method for low temperature **hydrothermal** synthesis of lithium ferrous phosphate nanomaterial)

IT **411234-54-3P**
RL: PRP (Properties); SPN (Synthetic preparation); TEM (Technical or engineered material use); PREP (Preparation); USES (Uses)
(method for low temperature **hydrothermal** synthesis of lithium ferrous phosphate nanomaterial)

IT **554-13-2**, Lithium carbonate **1310-65-2**, Lithium hydroxide 7447-41-8, Lithium chloride, reactions **7664-38-2**, Phosphoric acid, reactions 7720-78-7, Ferrous sulfate 7722-76-1, Ammonium dihydrogen phosphate 7758-94-3, Ferrous chloride 7783-28-0, Diammonium hydrogen phosphate 7790-69-4, Lithium nitrate 10138-04-2, Ammonium ferric sulfate 10377-48-7, Lithium sulfate
RL: RCT (Reactant); RACT (Reactant or reagent)
(method for low temperature **hydrothermal** synthesis of lithium ferrous phosphate nanomaterial)

L32 ANSWER 8 OF 20 HCAPLUS COPYRIGHT 2009 ACS on STN
AN 2008:875000 HCAPLUS Full-text
DN 149:248763
TI Method for preparing **electrode** material with ferrophosphorus
IN Wang, Guixin; Yan, Kangping
PA Sichuan University, Peop. Rep. China
SO Faming Zhuanli Shenqing Gongkai Shuomingshu, 9pp.
CODEN: CNXXEV
DT Patent
LA Chinese
FAN.CNT 1

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE

PI CN 101219783 A 20080716 CN 2008-10045243 200801 23

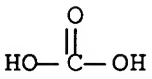
PRAI CN 2008-10045243 20080123

AB The title method can prepare **electrode** material such as LiFePO4, LiFePO4/FeP2, LiFePO4/C, Li3Fe2(PO4)3, FeP, FeP2, Fe2P, Fe3P, Fe-Co-P, Fe-Ni-P, Fe-Ni-Co-P, etc. from ferrophosphorus with or without addition of other elements by mech. activation method, reaction pulverization method, rheol. phase reaction method, spray drying method, spray pyrolysis method, solid phase method, microwave method, H2O/alc. thermal synthesis method, sol-gel method, ion exchange method, etc. The method has the advantages of wide raw material resources, low cost, simple operation, short flow process, etc., and realizes comprehensive use of resources.

IT **554-13-2**, Lithium carbonate **1310-65-2**, Lithium hydroxide
RL: RCT (Reactant); RACT (Reactant or reagent)
(method for preparing **electrode** material with ferrophosphorus)

RN 554-13-2 HCAPLUS

CN Carbonic acid, lithium salt (1:2) (CA INDEX NAME)



●2 Li

RN 1310-65-2 HCAPLUS

CN Lithium hydroxide (Li(OH)) (CA INDEX NAME)

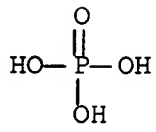
Li—OH

IT **15365-14-7P**, Iron lithium phosphate (FeLiPO4)
36058-25-0P, Iron lithium phosphate (Fe2Li3(PO4)3)
RL: SPN (Synthetic preparation); TEM (Technical or engineered material use); PREP (Preparation); USES (Uses)

(method for preparing **electrode** material with ferrophosphorus)

RN 15365-14-7 HCAPLUS

CN Phosphoric acid, iron(2+) lithium salt (1:1:1) (CA INDEX NAME)

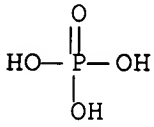


● Fe(II)

● Li

RN 36058-25-0 HCAPLUS

CN Phosphoric acid, iron(3+) lithium salt (3:2:3) (9CI) (CA INDEX NAME)



●2/3 Fe(III)

● Li

CC 49-5 (Industrial Inorganic Chemicals)
Section cross-reference(s): 52

ST **electrode** ferrophosphorus lithium iron phosphate

IT Alkali metal halides, reactions
RL: RCT (Reactant); RACT (Reactant or reagent)
(lithium halides; method for preparing **electrode** material

with ferrophosphorus)
IT **Electrodes**
Hydrothermal reaction
Ion exchange
Microwave
Pulverization
Rheology
Sol-gel processing
Solid phase synthesis
(method for preparing **electrode** material with ferrophosphorus)
IT Alcohols, uses
RL: NUU (Other use, unclassified); USES (Uses)
(method for preparing **electrode** material with ferrophosphorus)
IT Intermetallic compounds
RL: PEP (Physical, engineering or chemical process); RCT (Reactant); PROC (Process); RACT (Reactant or reagent)
(method for preparing **electrode** material with ferrophosphorus)
IT Calcination
Drying
(spray; method for preparing **electrode** material with ferrophosphorus)
IT 7429-90-5, Aluminum, uses 7439-89-6, Iron, uses 7439-92-1, Lead, uses 7439-93-2, Lithium, uses 7439-95-4, Magnesium, uses 7439-96-5, Manganese, uses 7440-02-0, Nickel, uses 7440-05-3, Palladium, uses 7440-06-4, Platinum, uses 7440-15-5, Rhenium, uses 7440-18-8, Ruthenium, uses 7440-21-3, Silicon, uses 7440-22-4, Silver, uses 7440-23-5, Sodium, uses 7440-28-0, Thallium, uses 7440-31-5, Tin, uses 7440-32-6, Titanium, uses 7440-38-2, Arsenic, uses 7440-39-3, Barium, uses 7440-42-8, Boron, uses 7440-43-9, Cadmium, uses 7440-44-0, Carbon, uses 7440-47-3, Chromium, uses 7440-48-4, Cobalt, uses 7440-50-8, Copper, uses 7440-55-3, Gallium, uses 7440-57-5, Gold, uses 7440-62-2, Vanadium, uses 7440-66-6, Zinc, uses 7440-67-7, Zirconium, uses 7440-70-2, Calcium, uses 7440-74-6, Indium, uses 7553-56-2, Iodine, uses 7704-34-9, Sulfur, uses 7723-14-0, Phosphorus, uses 7727-37-9, Nitrogen, uses 7782-41-4, Fluorine, uses 7782-44-7, Oxygen, uses
RL: MOA (Modifier or additive use); USES (Uses)
(method for preparing **electrode** material with ferrophosphorus)
IT 12022-85-4, Iron phosphide (FeP2)
RL: PEP (Physical, engineering or chemical process); RCT (Reactant); PROC (Process); RACT (Reactant or reagent)
(method for preparing **electrode** material with

ferrophosphorus)

IT 546-89-4, Lithium acetate **554-13-2**, Lithium carbonate **1310-65-2**, Lithium hydroxide 10377-52-3, Lithium phosphate 13453-80-0, Lithium dihydrogen phosphate 33943-39-4, Dilithium hydrogen phosphate
RL: RCT (Reactant); RACT (Reactant or reagent)
(method for preparing **electrode** material with ferrophosphorus)

IT 1310-43-6P, Iron phosphide (Fe2P)
RL: RCT (Reactant); SPN (Synthetic preparation); TEM (Technical or engineered material use); PREP (Preparation); RACT (Reactant or reagent); USES (Uses)
(method for preparing **electrode** material with ferrophosphorus)

IT 37255-58-6
RL: RCT (Reactant); TEM (Technical or engineered material use); RACT (Reactant or reagent); USES (Uses)
(method for preparing **electrode** material with ferrophosphorus)

IT 12674-76-9P **15365-14-7P**, Iron lithium phosphate (FeLiPO4) **36058-25-0P**, Iron lithium phosphate (Fe2Li3(PO4)3) 50954-84-2P 71849-39-3P
RL: SPN (Synthetic preparation); TEM (Technical or engineered material use); PREP (Preparation); USES (Uses)
(method for preparing **electrode** material with ferrophosphorus)

L32 ANSWER 9 OF 20 HCAPLUS COPYRIGHT 2009 ACS on STN
AN 2008:669636 HCAPLUS Full-text
DN 149:13781
TI Cathode active mass for secondary lithium batteries, and their manufacture, and the batteries
IN Oshita, Itaru; Kanzaki, Kazuo
PA Hitachi Maxell Ltd., Japan
SO Jpn. Kokai Tokkyo Koho, 14pp.
CODEN: JKXXAF
DT Patent
LA Japanese
FAN.CNT 1

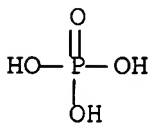
PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI JP 2008130526	A	20080605	JP 2006-317924	200611 27
PRAI JP 2006-317924		20061127		

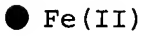
AB The active mass have olivine-type lithium iron phosphate primary particles and carbon-containing secondary particles, and the secondary particles have approx. spindle-, rhombus- or oval shape. The active mass is manufactured by a process including steps of (1) mixing lithium iron phosphate feedstock, carbonaceous materials, and C2-4 compds. bearing 2-3 hydroxy groups, and (2) heat treatment of the mixts. by **hydrothermal** crystallization, glycothermal process, or combination of two processes. Secondary Li batteries employing the cathode active mass are capable of high-speed charging and discharging and show high discharge capacity.

IT **15365-14-7P**, Iron lithium phosphate (LiFePO4)
RL: IMF (Industrial manufacture); TEM (Technical or engineered material use); PREP (Preparation); USES (Uses)
(olivine-type, composites with carbon, cathode active mass; manufacture of lithium iron phosphate-carbon composite granules as secondary Li battery cathodes)

RN 15365-14-7 HCAPLUS

CN Phosphoric acid, iron(2+) lithium salt (1:1:1) (CA INDEX NAME)





CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)

ST battery cathode lithium iron phosphate composite carbon; **hydrothermal** crystn lithium iron phosphate composite battery cathode; glycothermal process lithium iron phosphate composite battery cathode

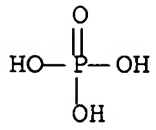
IT **Carbon fibers**, uses
Fullerenes
RL: TEM (Technical or engineered material use); USES (Uses)
(composites with lithium iron phosphates, cathode active mass; manufacture of lithium iron phosphate-carbon composite granules as secondary Li battery cathodes)

IT Battery cathodes

Hydrothermal crystallization
(manufacture of lithium iron phosphate-carbon composite granules as
secondary Li battery cathodes)

IT **15365-14-7P**, Iron lithium phosphate (LiFePO4)
RL: IMF (Industrial manufacture); TEM (Technical or engineered material use); PREP (Preparation); USES (Uses)
(olivine-type, composites with carbon, cathode active mass; manufacture of lithium iron phosphate-carbon composite granules as secondary Li battery cathodes)

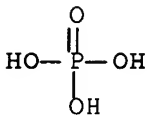
L32 ANSWER 10 OF 20 HCAPLUS COPYRIGHT 2009 ACS on STN
AN 2008:550188 HCAPLUS Full-text
DN 150:103642
TI High-rate properties of LiFePO4/carbon composites as cathode materials for lithium-ion **batteries**
AU Kuwahara, Akira; Suzuki, Shinya; Miyayama, Masaru
CS Research Center for Advanced Science and Technology, The University of Tokyo, 4-6-1 Komaba, Meguro, Tokyo, 153-8904, Japan
SO Ceramics International (2008), 34(4), 863-866
CODEN: CINNDH; ISSN: 0272-8842
PB Elsevier Ltd.
DT Journal
LA English
AB Electrochem. properties of LiFePO4/carbon composites were investigated to achieve a high-rate lithium **electrode** performance. LiFePO4/carbon composites were synthesized by a **hydrothermal** reaction of a solution of FeSO4·7H2O, H3PO4, and LiOH·H2O mixed with carbon powders under nitrogen atmospheric followed by annealing under 1% H2-99% Ar atmospheric Particle size of the obtained LiFePO4/carbon composites observed by SEM was less than 100 nm. At a high c.d. of 1000 mA g-1, the LiFePO4/carbon composites showed a high discharge capacity of 113 mA h g-1, and a flat discharge potential plateau was observed around 3.4 V. The discharge capacity at the high c.d., 85% of that at a low c.d. of 30 mA g-1, is a quite high value for LiFePO4 cathodes. Homogeneous microstructure consisting of small particles contributed to the high-rate properties of the LiFePO4/carbon composites.
IT **15365-14-7**, Iron lithium phosphate (FeLiPO4)
RL: PEP (Physical, engineering or chemical process); PRP (Properties); PROC (Process)
(in composites; high-rate discharge of **hydrothermally** -prepared LiFePO4/carbon composites for lithium-ion **battery** cathodes)
RN 15365-14-7 HCAPLUS
CN Phosphoric acid, iron(2+) lithium salt (1:1:1) (CA INDEX NAME)



● Fe(II)

● Li

IT 7664-38-2, Phosphoric acid, processes
RL: PEP (Physical, engineering or chemical process); RCT (Reactant); PROC (Process); RACT (Reactant or reagent)
(precursors; high-rate discharge of **hydrothermally**-prepared LiFePO4/carbon composites for lithium-ion **battery** cathodes)
RN 7664-38-2 HCAPLUS
CN Phosphoric acid (CA INDEX NAME)



CC 57-8 (Ceramics)
Section cross-reference(s): 52
ST lithium iron phosphate carbon composite cathode **battery** **hydrothermal** synthesis
IT Annealing
Battery cathodes
Hydrothermal reaction
Microstructure
(high-rate discharge of **hydrothermally**-prepared LiFePO4/carbon composites for lithium-ion **battery** cathodes)
IT Composites
(lithium iron phosphate/carbon; high-rate discharge of

hydrothermally-prepared LiFePO4/carbon composites for lithium-ion **battery** cathodes)

IT Secondary **batteries**
(lithium; high-rate discharge of **hydrothermally**-prepared LiFePO4/carbon composites for lithium-ion **battery** cathodes)

IT 7440-44-0, Carbon, processes 15365-14-7, Iron lithium phosphate (FeLiPO4)
RL: PEP (Physical, engineering or chemical process); PRP (Properties); PROC (Process)
(in composites; high-rate discharge of **hydrothermally**-prepared LiFePO4/carbon composites for lithium-ion **battery** cathodes)

IT 1310-66-3 7664-38-2, Phosphoric acid, processes 7782-63-0, Iron sulfate (FeSO4) heptahydrate
RL: PEP (Physical, engineering or chemical process); RCT (Reactant); PROC (Process); RACT (Reactant or reagent)
(precursors; high-rate discharge of **hydrothermally**-prepared LiFePO4/carbon composites for lithium-ion **battery** cathodes)

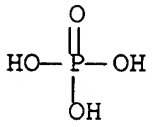
OSC.G 2 THERE ARE 2 CAPLUS RECORDS THAT CITE THIS RECORD (2 CITINGS)

RE.CNT 13 THERE ARE 13 CITED REFERENCES AVAILABLE FOR THIS RECORD ALL CITATIONS AVAILABLE IN THE RE FORMAT

L32 ANSWER 11 OF 20 HCAPLUS COPYRIGHT 2009 ACS on STN
AN 2008:8409 HCAPLUS Full-text
DN 149:474771
TI Pulsed laser deposition and electrochemical characterization of LiFePO4-Ag composite thin films
AU Lu, Zhouguang; Cheng, Hua; Lo, Mingfei; Chung, C. Y.
CS Department of Physics & Materials Science, City University of Hong Kong, Kowloon, Hong Kong SAR, Peop. Rep. China
SO Advanced Functional Materials (2007), 17(18), 3885-3896
CODEN: AFMDC6; ISSN: 1616-301X
PB Wiley-VCH Verlag GmbH & Co. KGaA
DT Journal
LA English
AB A simple approach is proposed to enhance the elec. conductivity of olivine-structured LiFePO4 thin films by uniformly dispersing small fractions of highly conductive silver (ca. 1.37 wt %) throughout the LiFePO4 film. In this approach, a highly densified (>85 %) LiFePO4-Ag target was first fabricated by coating conductive silver nanoparticles onto the surfaces of **hydrothermally** synthesized LiFePO4 ultrafine particles by a soft chemical route. Pulsed laser deposition (PLD) was then employed to deposit LiFePO4-Ag composite thin films on the Si/SiO2/Ti/Pt substrates. The PLD exptl. parameters were

optimized to obtain well-crystallized and olivine-phase pure LiFePO4-Ag composite thin films with smooth surfaces and homogeneous thicknesses. X-ray diffraction (XRD), SEM, Raman spectrometry (Raman), XPS, DC conductivity measurements, cyclic voltammetry(CV), as well as galvanostatic measurements were employed to characterize the as-obtained LiFePO4-Ag composite films. The results revealed that after silver incorporation, the olivine LiFePO4 film cathode shows a superior electrochem. performance with a good combination of moderate specific capacity, stable cycling, and most importantly, a remarkable tolerance against high rates and over-charging and -discharging.

IT **15365-14-7**, Iron Lithium phosphate FE LiPO4
RL: FMU (Formation, unclassified); TEM (Technical or engineered material use); FORM (Formation, nonpreparative); USES (Uses)
(pulsed laser deposition and electrochem. characterization of LiFePO4-Ag composite thin films)
RN 15365-14-7 HCAPLUS
CN Phosphoric acid, iron(2+) lithium salt (1:1:1) (CA INDEX NAME)



● Fe(II)

● Li

IT **1310-65-2**, Lithium hydroxide
RL: RCT (Reactant); RACT (Reactant or reagent)
(use in preparation of LiFePO4-Ag composite thin films)
RN 1310-65-2 HCAPLUS
CN Lithium hydroxide (Li(OH)) (CA INDEX NAME)

Li—OH

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 72, 73, 78
ST lithium iron phosphate silver composite film battery **electrode**
IT **15365-14-7**, Iron Lithium phosphate FE LiPO4
RL: FMU (Formation, unclassified); TEM (Technical or engineered material use); FORM (Formation, nonpreparative); USES (Uses)
(pulsed laser deposition and electrochem. characterization of LiFePO4-Ag composite thin films)
IT **1310-65-2**, Lithium hydroxide 7722-76-1, MonoAmmonium phosphate 10045-89-3, Ammonium iron sulfate
RL: RCT (Reactant); RACT (Reactant or reagent)
(use in preparation of LiFePO4-Ag composite thin films)
OSC.G 4 THERE ARE 4 CAPLUS RECORDS THAT CITE THIS RECORD (4 CITINGS)
RE.CNT 38 THERE ARE 38 CITED REFERENCES AVAILABLE FOR THIS RECORD ALL CITATIONS AVAILABLE IN THE RE FORMAT

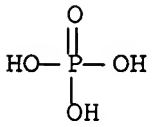
L32 ANSWER 12 OF 20 HCAPLUS COPYRIGHT 2009 ACS on STN
AN 2007:1089646 HCAPLUS Full-text
DN 147:389138
TI Manufacture of cathodes for secondary lithium ion batteries
IN Ono, Koji; Mori, Hiroyuki
PA Sumitomo Osaka Cement Co., Ltd., Japan
SO Jpn. Kokai Tokkyo Koho, 14pp.
CODEN: JKXXAF
DT Patent
LA Japanese
FAN.CNT 1

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI JP 2007250417	A	20070927	JP 2006-74247	200603 17
PRAI JP 2006-74247		20060317		

AB The cathodes contain primary particles, made of LixAyDzPO4 (A = Cr, Mn, Fe, Co, Ni, Cu; D = Mg, Ca, Sr, Ba, Ti, Zn, B, Al, Ga, In, Si, Ge, Sc, Y, rare earth metal; $0 < x < 2$; $0 < y < 1.5$; $0 \leq z < 1.5$), multiple particles of which are bonded to give secondary particles via carbon generated by **pyrolysis** of reducing **sugars**. The cathodes are manufactured by spraying and heating (suspension) solns. containing Li components, A components, D components, P components, and reducing sugars. The cathodes can be economically manufactured, and the batteries show high discharge capacity and stable charge-discharge cycling performance.
IT **411234-54-3P**, Iron lithium phosphate

RL: IMF (Industrial manufacture); TEM (Technical or engineered material use); PREP (Preparation); USES (Uses)
(cathodes; manufacture of lithium compound phosphate cathodes for secondary lithium ion batteries)

RN 411234-54-3 HCAPLUS
CN Phosphoric acid, iron lithium salt (9CI) (CA INDEX NAME)



●x Fe(x)

●x Li

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
ST battery cathode lithium transition metal phosphate manuf; **sugar pyrolysis** carbon binder manuf lithium compd phosphate battery
IT Binders
(carbon, prepared by **pyrolysis** of reducing **sugars** ; manufacture of lithium compound phosphate cathodes for secondary lithium ion batteries)
IT Carbohydrates, processes
RL: PEP (Physical, engineering or chemical process); PROC (Process)
(reducing **sugars**, **pyrolysis** of; in manufacture of lithium compound phosphate cathodes for secondary lithium ion batteries)
IT **411234-54-3P**, Iron lithium phosphate
RL: IMF (Industrial manufacture); TEM (Technical or engineered material use); PREP (Preparation); USES (Uses)
(cathodes; manufacture of lithium compound phosphate cathodes for secondary lithium ion batteries)

L32 ANSWER 13 OF 20 HCAPLUS COPYRIGHT 2009 ACS on STN
AN 2007:904386 HCAPLUS Full-text
DN 147:326211
TI Continuous **hydrothermal** method for synthesizing nanoscale LiFePO4 **electrode** material for lithium **batteries**

IN Yu, Wenli
PA Shanghai Jiao Tong University, Peop. Rep. China
SO Faming Zhuanli Shenqing Gongkai Shuomingshu, 6pp.
CODEN: CNXXEV
DT Patent
LA Chinese
FAN.CNT 1

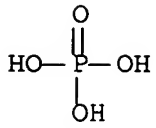
PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
CN 101016150	A	20070815	CN 2007-10037314	20070208
CN 100450921	C	20090114		

PRAI CN 2007-10037314 20070208

AB A continuous **hydrothermal** method for synthesizing nanoscale LiFePO4 **electrode** material includes (1) continuously pumping a lithium source, an iron source, a metal ion modifier, and a phosphoric acid source at a mol. ratio of 1:(1-x):x:1 (x = 0-0.1) into a high-temperature high-pressure reaction kettle, mixing, and reacting at 300-600° and 20-50 MPa for 30 s to 1 h to obtain a liquid product, and (2) spraying into a low-pressure flash evaporation chamber with a cyclone separator, evaporating at 80-200° and 0.01-0.8 MPa to exhaust water vapor from the top of the cyclone separator and to obtain solid granules at the bottom of the flash evaporation chamber, and collecting the solid granules to obtain a dry powder of LiFePO4. The obtained LiFePO4 product has a small particle size, a uniform size distribution, and high electrochem. activity.

IT **15365-14-7P**, Iron Lithium phosphate felipo4
RL: IMF (Industrial manufacture); PEP (Physical, engineering or chemical process); PRP (Properties); TEM (Technical or engineered material use); PREP (Preparation); PROC (Process); USES (Uses)
(synthesizing nanoscale LiFePO4 **electrode** material for lithium **batteries**)

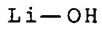
RN 15365-14-7 HCAPLUS
CN Phosphoric acid, iron(2+) lithium salt (1:1:1) (CA INDEX NAME)



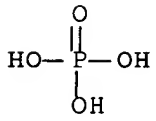
● Fe(II)

● Li

IT 1310-65-2, Lithium hydroxide 7664-38-2,
Phosphoric acid, reactions
RL: PEP (Physical, engineering or chemical process); RCT (Reactant);
PROC (Process); RACT (Reactant or reagent)
(synthesizing nanoscale LiFePO4 electrode material for
lithium batteries)
RN 1310-65-2 HCAPLUS
CN Lithium hydroxide (Li(OH)) (CA INDEX NAME)



RN 7664-38-2 HCAPLUS
CN Phosphoric acid (CA INDEX NAME)



CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
ST lithium iron phosphate electrode secondary lithium
battery
IT Evaporation
(flash; synthesizing nanoscale LiFePO4 electrode

material for lithium **batteries**)

IT Secondary **batteries**
(lithium; synthesizing nanoscale LiFePO4 **electrode** material for lithium **batteries**)

IT **Battery electrodes**
(synthesizing nanoscale LiFePO4 **electrode** material for lithium **batteries**)

IT **15365-14-7P**, Iron Lithium phosphate felipo4
RL: IMF (Industrial manufacture); PEP (Physical, engineering or chemical process); PRP (Properties); TEM (Technical or engineered material use); PREP (Preparation); PROC (Process); USES (Uses)
(synthesizing nanoscale LiFePO4 **electrode** material for lithium **batteries**)

IT 546-89-4, Lithium acetate **1310-65-2**, Lithium hydroxide 3094-87-9, Ferrous acetate **7664-38-2**, Phosphoric acid, reactions 7720-78-7, Ferrous sulfate 7722-76-1, Ammonium dihydrogen phosphate 7783-28-0, Diammonium hydrogen phosphate 7786-30-3, Magnesium chloride, reactions
RL: PEP (Physical, engineering or chemical process); RCT (Reactant); PROC (Process); RACT (Reactant or reagent)
(synthesizing nanoscale LiFePO4 **electrode** material for lithium **batteries**)

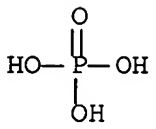
L32 ANSWER 14 OF 20 HCAPLUS COPYRIGHT 2009 ACS on STN
AN 2007:809669 HCAPLUS Full-text
DN 147:388884
TI Synthesis of nanocrystals and morphology control of **hydrothermally** prepared LiFePO4
AU Ellis, B.; Kan, Wang Hay; Makahnouk, W. R. M.; Nazar, L. F.
CS Department of Chemistry, University of Waterloo, Waterloo, ON, N2L 3G1, Can.
SO Journal of Materials Chemistry (2007), 17(30), 3248-3254
CODEN: JMACEP; ISSN: 0959-9428
PB Royal Society of Chemistry
DT Journal
LA English
AB Li transition **metal phosphate** olivines such as LiFePO4 are promising **electrodes** for Li-ion **batteries** because of their energy storage capacity combined with electrochem. and thermal stability. A key issue in these materials is to determine the synthetic conditions for optimum control of particle size and morphol., and ideally to find those that result in nanocryst. products. The synthesis of the material via **hydrothermal** methods to give single phase nanocryst. materials of LiFePO4 and LiMnPO4, and their solid solns. with Mg2+ are discussed. A reaction mechanism is proposed. Variation of the synthesis parameters showed that increasing reactant concentration favors the formation of nanocryst. products, but as less defect-free

materials are formed at temps. >180°, and ideally >200°, nucleation and growth can be controlled using polymeric or surfactant additives. The nature of the precursor and C-containing additives in the autoclave affects morphol. and electrochem. properties.

IT 13826-59-0P, Lithium manganese phosphate (LiMnPO4)
RL: PRP (Properties); SPN (Synthetic preparation); TEM (Technical or engineered material use); PREP (Preparation); USES (Uses)
(**hydrothermal** synthesis of nanocryst. LiMnPO4 cathode material for lithium **batteries**)

RN 13826-59-0 HCAPLUS

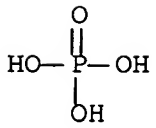
CN Phosphoric acid, lithium manganese(2+) salt (1:1:1) (9CI) (CA INDEX NAME)



IT 15365-14-7P, Iron lithium phosphate (FeLiPO4)
RL: PRP (Properties); SPN (Synthetic preparation); TEM (Technical or engineered material use); PREP (Preparation); USES (Uses)
(**hydrothermal** synthesis with morphol. control of nanocryst. LiFePO4 cathode material for lithium **batteries**)

RN 15365-14-7 HCAPLUS

CN Phosphoric acid, iron(2+) lithium salt (1:1:1) (CA INDEX NAME)



● Fe(II)

● Li

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
ST nanocryst iron lithium phosphate cathode **hydrothermal** synthesis lithium **battery**
IT **Battery** cathodes
Hydrothermal reaction
Microstructure
Nanocrystals
(**hydrothermal** synthesis with morphol. control of nanocryst. LiFePO4 cathode material for lithium **batteries**)
IT 691397-13-4
RL: PEP (Physical, engineering or chemical process); PROC (Process)
(P123; in **hydrothermal** synthesis of nanocryst. LiFePO4 cathode material for lithium **batteries**)
IT **13826-59-0P**, Lithium manganese phosphate (LiMnPO4)
RL: PRP (Properties); SPN (Synthetic preparation); TEM (Technical or engineered material use); PREP (Preparation); USES (Uses)
(**hydrothermal** synthesis of nanocryst. LiMnPO4 cathode material for lithium **batteries**)
IT **15365-14-7P**, Iron lithium phosphate (FeLiPO4)
RL: PRP (Properties); SPN (Synthetic preparation); TEM (Technical or engineered material use); PREP (Preparation); USES (Uses)
(**hydrothermal** synthesis with morphol. control of nanocryst. LiFePO4 cathode material for lithium **batteries**)
IT 50-81-7, Ascorbic acid, processes 77-92-9, Citric acid, processes 9003-01-4, Poly(acrylic acid) 84166-37-0, FC 4 (surfactant)
RL: PEP (Physical, engineering or chemical process); PROC (Process)
(in **hydrothermal** synthesis of nanocryst. LiFePO4 cathode material for lithium **batteries**)
IT 16674-61-6, Ammonium iron phosphate ((NH4)FePO4) monohydrate
RL: PEP (Physical, engineering or chemical process); PRP

(Properties); PROC (Process)
(in **hydrothermal** synthesis of nanocryst. LiFePO4 cathode material for lithium **batteries**)
OSC.G 14 THERE ARE 14 CAPLUS RECORDS THAT CITE THIS RECORD (14 CITINGS)
RE.CNT 33 THERE ARE 33 CITED REFERENCES AVAILABLE FOR THIS RECORD ALL CITATIONS AVAILABLE IN THE RE FORMAT

L32 ANSWER 15 OF 20 HCAPLUS COPYRIGHT 2009 ACS on STN
AN 2006:1010909 HCAPLUS Full-text
DN 145:339215
TI Manufacture of low-cost **electrode** materials of lithium aluminum phosphates, cathodes therefrom, and secondary lithium **batteries** therewith
IN Toge, Yoshiyuki; Saito, Mitsumasa; Yamada, Satoshi
PA Sumitomo Osaka Cement Co., Ltd., Japan
SO Jpn. Kokai Tokkyo Koho, 13pp.
CODEN: JKXXAF
DT Patent
LA Japanese
FAN.CNT 1

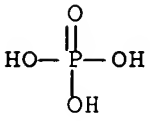
PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI JP 2006261060	A	20060928	JP 2005-80159	200503 18
PRAI JP 2005-80159		20050318		

AB The **electrode** materials comprising LixAlyAzPO4 (A = Co, Mn, Ni, Fe, Cu, Cr; x + 3y + 2z = 3; x, y, z >0) are manufactured by adding Li, A, Al, and PO4 sources and organic acids to water-based solvents to give solns. and reacting at high temperature and pressure. Alternatively, **electrode** materials comprising LixAlyAzBwPO4 (A = same as above; B = Mg, Ca, Sr, Sc, Y, Ti, Zr, V, Nb, Cr, Mo, W, Mn, Fe, Co, Ni, Cu, Ag, Zn, In, Sn, Sb, and/or rare earth metal other than A; x + 3y + 2z + nw = 3; x, y, z, w >0; n = valency of B) are manufactured by reacting Li, A, B, Al, and PO4 sources and organic acids as above. Secondary lithium **batteries** equipped with cathodes from the materials show high discharge capacity and stable charge-discharge cycle performance.
IT **1310-65-2**, Lithium hydroxide **7664-38-2**, Phosphoric acid, reactions
RL: RCT (Reactant); RACT (Reactant or reagent)
(in preparation of cathodes; manufacture of aluminum-containing lithium iron
phosphates as low-cost cathode materials for secondary lithium **batteries**)

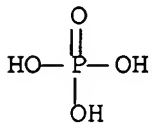
RN 1310-65-2 HCAPLUS
CN Lithium hydroxide (Li(OH)) (CA INDEX NAME)

Li—OH

RN 7664-38-2 HCAPLUS
CN Phosphoric acid (CA INDEX NAME)



IT **15365-14-7P**, Iron lithium phosphate (LiFePO4)
RL: DEV (Device component use); IMF (Industrial manufacture); PREP (Preparation); USES (Uses)
(triphylite-type, aluminum-doped; manufacture of aluminum-containing
lithium iron phosphates as low-cost cathode materials for secondary lithium **batteries**)
RN 15365-14-7 HCAPLUS
CN Phosphoric acid, iron(2+) lithium salt (1:1:1) (CA INDEX NAME)



● Fe(II)

● Li

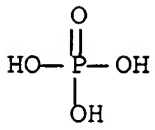
CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 57
ST secondary **battery** cathode aluminum iron lithium phosphate; aluminum magnesium doped triphylite **hydrothermal** synthesis lithium **battery** cathode
IT Secondary **batteries**
(lithium; manufacture of aluminum-containing lithium iron phosphates as
low-cost cathode materials for secondary lithium **batteries**)
IT **Battery** cathodes
Hydrothermal reactions
(manufacture of aluminum-containing lithium iron phosphates as low-cost
cathode materials for secondary lithium **batteries**)
IT Acids, uses
RL: NUU (Other use, unclassified); USES (Uses)
(organic, in preparation of cathodes; manufacture of aluminum-containing lithium
iron phosphates as low-cost cathode materials for secondary lithium **batteries**)
IT 50-21-5, Lactic acid, uses 64-18-6, Formic acid, uses 77-92-9, Citric acid, uses 79-10-7, Acrylic acid, uses 79-41-4, Methacrylic acid, uses 87-69-4, Tartaric acid, uses 110-15-6, Succinic acid, uses 110-16-7, Maleic acid, uses 141-82-2, Malonic acid, uses 6915-15-7, Malic acid 9003-01-4, Poly(acrylic acid)
RL: NUU (Other use, unclassified); USES (Uses)
(in preparation of cathodes; manufacture of aluminum-containing lithium iron
phosphates as low-cost cathode materials for secondary lithium **batteries**)
IT 1310-65-2, Lithium hydroxide 7664-38-2, Phosphoric acid, reactions 7720-78-7, Iron sulfate (FeSO4) 10043-01-3, Aluminum sulfate
RL: RCT (Reactant); RACT (Reactant or reagent)
(in preparation of cathodes; manufacture of aluminum-containing lithium iron
phosphates as low-cost cathode materials for secondary lithium **batteries**)
IT 7429-90-5P, Aluminum, uses 7439-95-4P, Magnesium, uses
RL: DEV (Device component use); IMF (Industrial manufacture); MOA (Modifier or additive use); PREP (Preparation); USES (Uses)
(iron lithium phosphate doped with; manufacture of aluminum-containing
lithium iron phosphates as low-cost cathode materials for secondary lithium **batteries**)

IT 15365-14-7P, Iron lithium phosphate (LiFePO4)
RL: DEV (Device component use); IMF (Industrial manufacture); PREP (Preparation); USES (Uses)
(triphylite-type, aluminum-doped; manufacture of aluminum-containing
lithium iron phosphates as low-cost cathode materials for secondary lithium batteries)
OSC.G 1 THERE ARE 1 CAPLUS RECORDS THAT CITE THIS RECORD (1 CITINGS)

L32 ANSWER 16 OF 20 HCAPLUS COPYRIGHT 2009 ACS on STN
AN 2006:981945 HCAPLUS Full-text
DN 145:359392
TI Cyclic process for wet-chemical production of lithium metal phosphates
IN Nuspl, Gerhard; Vogler, Christian; Zuber, Josefine
PA Sued-Chemie A.-G., Germany
SO PCT Int. Appl., 41pp.
CODEN: PIXXD2
DT Patent
LA German
FAN.CNT 1

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI WO 2006097324	A2	20060921	WO 2006-EP2472	200603 17
WO 2006097324	A3	20070412		
W: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KN, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, LY, MA, MD, MG, MK, MN, MW, MX, MZ, NA, NG, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SM, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW				
RW: AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IS, IT, LT, LU, LV, MC, NL, PL, PT, RO, SE, SI, SK, TR, BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG, BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM, AP, EA, EP, OA				
DE 102005012640	A1	20060921	DE 2005-102005012640	200503 18
CA 2599481	A1	20060921	CA 2006-2599481	200603 17

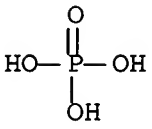
EP 1858804 A2 20071128 EP 2006-723511
200603
17
R: AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IS, IT, LI, LT, LU, LV, MC, NL, PL, PT, RO, SE, SI, SK, TR
JP 2008532910 T 20080821 JP 2008-501235
200603
17
CN 101142138 A 20080312 CN 2006-80008732
200709
18
KR 2007112278 A 20071122 KR 2007-723632
200710
15
US 20090117022 A1 20090507 US 2008-908832
200811
13
PRAI DE 2005-102005012640 A 20050318
WO 2006-EP2472 W 20060317
ASSIGNMENT HISTORY FOR US PATENT AVAILABLE IN LSUS DISPLAY FORMAT
AB The invention relates to a method for producing lithium metal phosphates LiMPO4 (where M = bivalent metal, preferably selected from the 1st transition metal range). The method involves reacting of a Li3PO4 with a metal salt and an acid phosphate source in a polar solvent for converting to a corresponding M-containing phosphate, adding a basic Li source for obtaining a precursor mixture for a desired Li metal phosphate, converting and separating the resulting mixture, preferably under **hydrothermal** conditions in such a way that a desired final product is obtained and separated; a Li-containing filtrate is obtained. Addition of the basic Li source initiates a Li ion precipitation in the form of a Li3PO4. The resulting Li3PO4 can be reused in the form of a raw material. The arrangement increases the Li utilization.
IT **13824-63-0P**, Cobalt lithium phosphate (CoLiPO4)
13826-59-0P, Lithium manganese phosphate (LiMnPO4)
13977-83-8P, Lithium nickel phosphate (LiNiPO4)
15365-14-7P, Iron lithium phosphate (FeLiPO4)
RL: CPS (Chemical process); IMF (Industrial manufacture); PEP (Physical, engineering or chemical process); PREP (Preparation); PROC (Process)
(cyclic process for wet-chemical production of)
RN 13824-63-0 HCAPLUS
CN Phosphoric acid, cobalt(2+) lithium salt (8CI, 9CI) (CA INDEX NAME)



● Co(II)

● Li

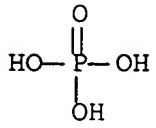
RN 13826-59-0 HCAPLUS
CN Phosphoric acid, lithium manganese(2+) salt (1:1:1) (9CI) (CA INDEX NAME)



● Li

● Mn(II)

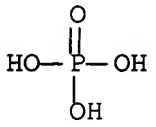
RN 13977-83-8 HCAPLUS
CN Phosphoric acid, lithium nickel(2+) salt (1:1:1) (8CI, 9CI) (CA INDEX NAME)



● Li

● Ni(II)

RN 15365-14-7 HCAPLUS
CN Phosphoric acid, iron(2+) lithium salt (1:1:1) (CA INDEX NAME)



● Fe(II)

● Li

IC ICM C01B
CC 49-5 (Industrial Inorganic Chemicals)
Section cross-reference(s): 52
IT **Carbon fibers**, uses
RL: MOA (Modifier or additive use); USES (Uses)
(additive in cyclic process for wet-chemical production of lithium metal
phosphates)
IT **13824-63-0P**, Cobalt lithium phosphate (CoLiPO4)
13826-59-0P, Lithium manganese phosphate (LiMnPO4)
13977-83-8P, Lithium nickel phosphate (LiNiPO4)
15365-14-7P, Iron lithium phosphate (FeLiPO4)
RL: CPS (Chemical process); IMF (Industrial manufacture); PEP

(Physical, engineering or chemical process); PREP (Preparation); PROC (Process)
(cyclic process for wet-chemical production of)
RE.CNT 3 THERE ARE 3 CITED REFERENCES AVAILABLE FOR THIS RECORD
ALL CITATIONS AVAILABLE IN THE RE FORMAT

L32 ANSWER 17 OF 20 HCAPLUS COPYRIGHT 2009 ACS on STN
AN 2005:493556 HCAPLUS Full-text
DN 143:29507
TI Lithium **metal phosphates**, method for their production, and their use as **battery electrode** materials
IN Nuspl, Gerhard; Wimmer, Lucia; Eisgruber, Max
PA Sued-Chemie A.-G., Germany
SO PCT Int. Appl., 51 pp.
CODEN: PIXXD2
DT Patent
LA German
FAN.CNT 1

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI WO 2005051840	A1	20050609	WO 2004-EP12911	200411 14
W: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NA, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW				
RW: BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IS, IT, LU, MC, NL, PL, PT, RO, SE, SI, SK, TR, BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG				
DE 10353266	A1	20050616	DE 2003-10353266	200311 14
TW 266744	B	20061121	TW 2004-93134723	200411 12
CA 2537278	A1	20050609	CA 2004-2537278	200411 14
CA 2537278	C	20071113		

EP 1682446	A1	20060726	EP 2004-803141	200411 14
R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, SI, FI, RO, CY, TR, BG, CZ, EE, HU, PL, SK, IS				
CN 1867514	A	20061122	CN 2004-80029822	200411 14
JP 2007511458	T	20070510	JP 2006-538815	200411 14
JP 4176804	B2	20081105		
US 20070054187	A1	20070308	US 2006-578032	200605 02
KR 2006120112	A	20061124	KR 2006-709375	200605 15
PRAI DE 2003-10353266	A	20031114		
WO 2004-EP12911	W	20041114		

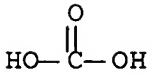
ASSIGNMENT HISTORY FOR US PATENT AVAILABLE IN LSUS DISPLAY FORMAT

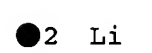
AB The invention relates to a method for producing a compound of a formula LiMPO4 (M = metal of the 1st transition series). The method comprises following steps: (a) production of a precursor mixture containing ≥1 Li+ source, ≥1 M2+ source, and ≥1 PO43- source to obtain a precipitate and produce a precursor suspension; (b) treatment of the precursor mixture and/or precursor suspension by dispersion or grinding until 90% of the particles in the precursor suspension is <50 μm; and (c) recovery of LiMPO4 from the precursor suspension obtained in step b, preferably by conversion under **hydrothermal** conditions. The resulting product exhibits particularly suitable particle-size distributions and electrochem. characteristics for **battery electrodes**.

IT **554-13-2**, Lithium carbonate **1310-65-2**, Lithium hydroxide **7664-38-2**, Phosphoric acid, reactions
RL: RCT (Reactant); RACT (Reactant or reagent)
(in synthesis of iron lithium phosphate for **battery electrodes**)

RN 554-13-2 HCAPLUS

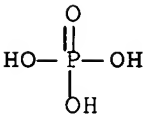
CN Carbonic acid, lithium salt (1:2) (CA INDEX NAME)



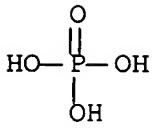


RN 1310-65-2 HCAPLUS
CN Lithium hydroxide (Li(OH)) (CA INDEX NAME)

RN 7664-38-2 HCAPLUS
CN Phosphoric acid (CA INDEX NAME)



IT **15365-14-7P**, Iron lithium phosphate (LiFePO4)
RL: CPS (Chemical process); IMF (Industrial manufacture); PEP (Physical, engineering or chemical process); PREP (Preparation); PROC (Process)
(synthesis by **hydrothermal** reaction)
RN 15365-14-7 HCAPLUS
CN Phosphoric acid, iron(2+) lithium salt (1:1:1) (CA INDEX NAME)



● Fe(II)

● Li

IC ICM C01B025-45
ICS H01M004-58; H01M004-02
CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 49
ST lithium metal phosphate prodn battery electrode; iron lithium phosphate prodn battery electrode
IT Carbon fibers, uses
RL: TEM (Technical or engineered material use); USES (Uses)
(in preparation of iron lithium phosphate-containing battery electrodes)
IT Thermal decomposition
(in pyrolysis of sugars or cellulose for preparation of iron lithium phosphate-containing battery electrodes)
IT Centrifugation
Filtration
Hydrothermal reactions
(in synthesis of iron lithium phosphate for battery electrodes)
IT Carbohydrates, uses
RL: TEM (Technical or engineered material use); USES (Uses)
(pyrolysis of sugars or cellulose for preparation of iron lithium phosphate-containing battery electrodes)
IT Battery electrodes
(synthesis of iron lithium phosphate for)
IT 7440-44-0, Carbon, uses
RL: TEM (Technical or engineered material use); USES (Uses)
(in preparation of iron lithium phosphate-containing battery electrodes)
IT 554-13-2, Lithium carbonate 1310-65-2, Lithium

hydroxide 7664-38-2, Phosphoric acid, reactions
7720-78-7, Iron sulfate (FeSO4) 7758-94-3, Iron chloride (FeCl2)
14013-86-6, Iron nitrate (Fe(NO3)2) 14940-41-1, Iron phosphate (Fe3(PO4)2)
RL: RCT (Reactant); RACT (Reactant or reagent)
(in synthesis of iron lithium phosphate for **battery electrodes**)

IT 63-42-3, Lactose 9004-34-6, **Cellulose**, uses
RL: TEM (Technical or engineered material use); USES (Uses)
(**pyrolysis** of **sugars** or **cellulose** for preparation of iron lithium phosphate-containing **battery electrodes**)

IT **15365-14-7P**, Iron lithium phosphate (LiFePO4)
RL: CPS (Chemical process); IMF (Industrial manufacture); PEP (Physical, engineering or chemical process); PREP (Preparation); PROC (Process)
(synthesis by **hydrothermal** reaction)

OSC.G 12 THERE ARE 12 CAPLUS RECORDS THAT CITE THIS RECORD (13 CITINGS)

RE.CNT 5 THERE ARE 5 CITED REFERENCES AVAILABLE FOR THIS RECORD ALL CITATIONS AVAILABLE IN THE RE FORMAT

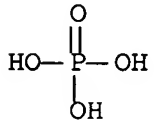
L32 ANSWER 18 OF 20 HCAPLUS COPYRIGHT 2009 ACS on STN
AN 2005:408603 HCAPLUS Full-text
DN 142:433160
TI Secondary lithium batteries, and their cathodes, and preparation of same cathodes
IN Miyayama, Masaru; Kimura, Kaori; Katayama, Hideaki; Nagai, Ryu
PA Hitachi Maxell Ltd., Japan
SO Jpn. Kokai Tokkyo Koho, 11 pp.
CODEN: JKXXAF
DT Patent
LA Japanese
FAN.CNT 1

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI JP 2005123107	A	20050512	JP 2003-358780	200310 20
PRAI JP 2003-358780		20031020		

AB The cathodes are made of composites of olivine-type LiFePO4 and carbon(aceous materials). The composites are prepared by a process comprising steps of (1) stir mixing of (a) carbon(naceous materials), (b) ≥1 selected from FeSO4, FeSO4.nH2O FeCl2, FeCl2.nH2O, (NH4)2Fe(SO4)2, and (NH4)2Fe(SO4)2.nH2O, (c) ≥1 selected from LiOH and LiOH.nH2O, and (d) H3PO4, and **hydrothermal** treatment to give

precursors of LiFePO4, and then (2) annealing the precursors at 400-600° in inert gas atmospheric The batteries can be fast charging/discharging and show high discharge capacity.

IT **15365-14-7P**, Iron lithium phosphate (FeLiPO4)
RL: DEV (Device component use); IMF (Industrial manufacture); PREP (Preparation); USES (Uses)
(composites with carbon; preparation of secondary Li battery cathode
made of composite of olivine-type LiFePO4 and carbon)
RN 15365-14-7 HCAPLUS
CN Phosphoric acid, iron(2+) lithium salt (1:1:1) (CA INDEX NAME)



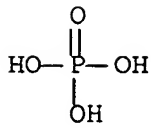
● Fe(II)

● Li

IC ICM H01M004-58
ICS C01B031-02; C01B031-04; H01M010-40; H01M004-02
CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
ST battery cathode lithium iron phosphate composite carbon; **hydrothermal** prepn lithium iron phosphate composite battery cathode
IT **Carbon fibers**, uses
RL: DEV (Device component use); IMF (Industrial manufacture); PEP (Physical, engineering or chemical process); PYP (Physical process); PREP (Preparation); PROC (Process); USES (Uses)
(composite with olivine-type LiFePO4; in preparation of secondary Li
battery cathode made of composite of olivine-type LiFePO4 and carbon)
IT Battery cathodes
Hydrothermal reactions
(preparation of secondary Li battery cathode made of composite of olivine-type LiFePO4 and carbon)
IT **15365-14-7P**, Iron lithium phosphate (FeLiPO4)

RL: DEV (Device component use); IMF (Industrial manufacture); PREP (Preparation); USES (Uses)
(composites with carbon; preparation of secondary Li battery cathode
made of composite of olivine-type LiFePO4 and carbon)
OSC.G 1 THERE ARE 1 CAPLUS RECORDS THAT CITE THIS RECORD (1 CITINGS)

L32 ANSWER 19 OF 20 HCAPLUS COPYRIGHT 2009 ACS on STN
AN 2004:441650 HCAPLUS Full-text
DN 142:201338
TI Synthesis and characterization of LiFePO4/C composite used as lithium storage electrodes
AU Hu, Guo-rong; Zhang, Xin-long; Peng, Zhong-dong; Liao, Gang; Yu, Xiao-yuan
CS College of Metallurgical Science and Engineering, Central South University, Changsha, 410083, Peop. Rep. China
SO Transactions of Nonferrous Metals Society of China (2004), 14(2), 237-240
CODEN: TNMCEW; ISSN: 1003-6326
PB Science Press
DT Journal
LA English
AB LiFePO4/C composites with good rate capability and high energy d. were prepared by adding sugar to the synthetic precursor. A significant improvement in electrode performance was achieved. The resulting carbon contents in the sample 1 and sample 2 are 3.06% and 4.95 mass fraction, resp. It is believed that the synthesis of LiFePO4 with sugar added before heating is a good method because the synthesized particles with a uniform small size are covered by carbon. The performance of the cathodes was evaluated using coin cells. The samples were characterized by x-ray diffraction and SEM. The addition of carbon limits particles size growth and results in high electron conductivity The LiFePO4/C composites showed very good electrochem. performance, delivering about 142 mAh/g specific capacity when being cycled at the C/10 rate. The capacity fade upon cycling is very small.
IT **15365-14-7P**, Iron lithium phosphate (FeLiPO4)
RL: DEV (Device component use); SPN (Synthetic preparation); PREP (Preparation); USES (Uses)
(carbon-coated composites; synthesis and characterization of LiFePO4/C composite as candidate cathode materials for lithium storage batteries)
RN 15365-14-7 HCAPLUS
CN Phosphoric acid, iron(2+) lithium salt (1:1:1) (CA INDEX NAME)



● Fe(II)

● Li

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 49
ST lithium iron phosphate carbon composite battery cathode; **sugar pyrolysis** carbon composite battery cathode
IT **15365-14-7P**, Iron lithium phosphate (FeLiPO4)
RL: DEV (Device component use); SPN (Synthetic preparation); PREP (Preparation); USES (Uses)
(carbon-coated composites; synthesis and characterization of LiFePO4/C composite as candidate cathode materials for lithium storage batteries)
OSC.G 2 THERE ARE 2 CAPLUS RECORDS THAT CITE THIS RECORD (2 CITINGS)
RE.CNT 16 THERE ARE 16 CITED REFERENCES AVAILABLE FOR THIS RECORD
ALL CITATIONS AVAILABLE IN THE RE FORMAT

L32 ANSWER 20 OF 20 HCAPLUS COPYRIGHT 2009 ACS on STN
AN 2003:97868 HCAPLUS Full-text
DN 138:140078
TI Alkali/transition metal halo- and hydroxy-phosphates and related **electrode** active materials
IN Barker, Jeremy; Saidi, M. Yazid; Swoyer, Jeffrey L.
PA Valence Technology Inc., UK
SO U.S. Pat. Appl. Publ., 22 pp., Cont.-in-part of U.S. 6,387,568.
CODEN: USXXCO
DT Patent
LA English
FAN.CNT 5

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
US 20030027049	A1	20030206	US 2001-14822	200110

US 6777132	B2	20040817		26
US 6387568	B1	20020514	US 2000-559861	200004 27
AT 317157	T	20060215	AT 2001-916649	200103 14
TW 503596	B	20020921	TW 2001-90109979	200104 26
US 20030013019	A1	20030116	US 2001-45685	200111 07
US 6964827	B2	20051115		
US 20020168573	A1	20021114	US 2002-133091	200204 26
US 6855462	B2	20050215		
CA 2463872	A1	20030508	CA 2002-2463872	200210 18
WO 2003038930	A2	20030508	WO 2002-US33510	200210 18
WO 2003038930	A3	20040422		
W: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, OM, PH, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZM, ZW				
RW: GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, SK, TR, BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG				
AU 2002337911	A1	20030512	AU 2002-337911	200210 18
EP 1444744	A2	20040811	EP 2002-773814	200210 18
R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, SI, LT, LV, FI, RO, MK, CY, AL, TR, BG, CZ, EE, SK				
CN 1659728	A	20050824	CN 2002-821019	200210

					18
	JP 2006516172	T	20060622	JP 2003-541083	
					200210
					18
	US 20040265695	A1	20041230	US 2004-870135	
					200406
					16
	US 7214448	B2	20070508		
	US 20060014078	A1	20060119	US 2005-223082	
					200509
					09
	US 7270915	B2	20070918		
	US 20070009800	A1	20070111	US 2006-531824	
					200609
					14
	US 7524584	B2	20090428		
	US 20070190425	A1	20070816	US 2007-734678	
					200704
					12
	US 20080241043	A1	20081002	US 2008-135271	
					200806
					09
PRAI	US 2000-559861	A2	20000427		
	US 2001-14822	A2	20011026		
	US 2001-45685	A3	20011107		
	WO 2002-US33510	W	20021018		
	US 2004-870135	A2	20040616		
	US 2007-734678	A2	20070412		

ASSIGNMENT HISTORY FOR US PATENT AVAILABLE IN LSUS DISPLAY FORMAT

AB An electroactive material comprises: AaMb(XY4)cZd, wherein (a) A is selected from the group consisting of Li, Na, and/or K, and a = 0-8; (b) M is ≥1 metal, comprising ≥1 metal which is capable of undergoing oxidation to a higher valence state, and b = 1-3; (c) XY4 is selected from the group consisting of X'O4-xY'x, X'O4-yY'2y, X''S4, and mixts. thereof, where X' is P, As, Sb, Si, and/or Ge; X'' is P, As, Sb, Si, and/or Ge; Y' is halogen, x = 0-3; and y = 0-4; and c = 0-3; (d) Z is OH and/or halogen, d = 0-6; and wherein M, X, Y, Z, a, b, c, d, x, and y are selected so as to maintain the electroneutrality of the compound Preferred embodiments include those having where c=1, those where c=2, and those where c=3. Preferred embodiments include those where a ≤1 and c=1, those where a=2 and c=1, and those where a≥3 and c=3. This invention also provides **electrodes** comprising an **electrode** active material of this invention, and **batteries** that comprise a first **electrode** having an **electrode** active material of this invention; a second **electrode** having a compatible active material; and an electrolyte.

IT **52934-02-8P**, Cobalt lithium fluoride phosphate

52934-08-4P, Lithium nickel fluoride phosphate
484039-84-1P, Cobalt lithium fluoride phosphate
(CoLi2F(PO4)) 484039-86-3P, Iron lithium fluoride
phosphate (FeLi2F(PO4)) 484039-88-5P
484039-91-0P, Lithium nickel fluoride phosphate
(Li2NiF(PO4)) 484039-93-2P, Iron lithium fluoride
phosphate 484039-95-4P, Lithium manganese fluoride
phosphate (Li2MnF(PO4)) 484040-01-9P, Iron lithium
magnesium fluoride phosphate (Fe0.9Li1.25Mg0.1F0.25(PO4))
484040-14-4P, Iron lithium fluoride phosphate
(Fe2Li4F(PO4)3)) 484040-20-2P, Lithium manganese
fluoride phosphate (Li5Mn2F2(PO4)3) 484040-28-0P
493025-03-9P, Lithium manganese fluoride phosphate
RL: DEV (Device component use); SPN (Synthetic preparation); PREP
(Preparation); USES (Uses)
(alkali/transition metal halo- and hydroxy-phosphates and related
electrode active materials)

RN 52934-02-8 HCAPLUS
CN Cobalt lithium fluoride phosphate (CA INDEX NAME)

Component	Ratio	Component Registry Number
F	x	14762-94-8
O4P	x	14265-44-2
Co	x	7440-48-4
Li	x	7439-93-2

RN 52934-08-4 HCAPLUS
CN Lithium nickel fluoride phosphate (CA INDEX NAME)

Component	Ratio	Component Registry Number
F	x	14762-94-8
O4P	x	14265-44-2
Ni	x	7440-02-0
Li	x	7439-93-2

RN 484039-84-1 HCAPLUS
CN Cobalt lithium fluoride phosphate (CoLi2F(PO4)) (CA INDEX NAME)

Component	Ratio	Component Registry Number
F	1	14762-94-8
O4P	1	14265-44-2

Co	1	7440-48-4
Li	2	7439-93-2

RN 484039-86-3 HCAPLUS
CN Iron lithium fluoride phosphate (FeLi2F(PO4)) (CA INDEX NAME)

Component	Ratio	Component Registry Number
F	1	14762-94-8
O4P	1	14265-44-2
Li	2	7439-93-2
Fe	1	7439-89-6

RN 484039-88-5 HCAPLUS
CN Iron lithium magnesium fluoride phosphate (Fe0.9Li2Mg0.1F(PO4)) (CA INDEX NAME)

Component	Ratio	Component Registry Number
F	1	14762-94-8
O4P	1	14265-44-2
Mg	0.1	7439-95-4
Li	2	7439-93-2
Fe	0.9	7439-89-6

RN 484039-91-0 HCAPLUS
CN Lithium nickel fluoride phosphate (Li2NiF(PO4)) (CA INDEX NAME)

Component	Ratio	Component Registry Number
F	1	14762-94-8
O4P	1	14265-44-2
Ni	1	7440-02-0
Li	2	7439-93-2

RN 484039-93-2 HCAPLUS
CN Iron lithium fluoride phosphate (CA INDEX NAME)

Component	Ratio	Component Registry Number
F	x	14762-94-8
O4P	x	14265-44-2
Li	x	7439-93-2

Fe	x	7439-89-6

RN 484039-95-4 HCAPLUS
CN Lithium manganese fluoride phosphate (Li2MnF(PO4)) (CA INDEX NAME)

Component	Ratio	Component Registry Number
F	1	14762-94-8
O4P	1	14265-44-2
Mn	1	7439-96-5
Li	2	7439-93-2

RN 484040-01-9 HCAPLUS
CN Iron lithium magnesium fluoride phosphate (Fe0.9Li1.25Mg0.1F0.25(PO4)) (CA INDEX NAME)

Component	Ratio	Component Registry Number
F	0.25	14762-94-8
O4P	1	14265-44-2
Mg	0.1	7439-95-4
Li	1.25	7439-93-2
Fe	0.9	7439-89-6

RN 484040-14-4 HCAPLUS
CN Iron lithium fluoride phosphate (Fe2Li4F(PO4)3) (CA INDEX NAME)

Component	Ratio	Component Registry Number
F	1	14762-94-8
O4P	3	14265-44-2
Li	4	7439-93-2
Fe	2	7439-89-6

RN 484040-20-2 HCAPLUS
CN Lithium manganese fluoride phosphate (Li5Mn2F2(PO4)3) (CA INDEX NAME)

Component	Ratio	Component Registry Number
F	2	14762-94-8
O4P	3	14265-44-2
Mn	2	7439-96-5

Li	5	7439-93-2

RN 484040-28-0 HCAPLUS
CN Aluminum cobalt lithium magnesium fluoride phosphate (Al0.02Co0.9Li2.02Mg0.05F(PO4)) (CA INDEX NAME)

Component	Ratio	Component Registry Number
F	1	14762-94-8
O4P	1	14265-44-2
Co	0.9	7440-48-4
Mg	0.05	7439-95-4
Li	2.02	7439-93-2
Al	0.02	7429-90-5

RN 493025-03-9 HCAPLUS
CN Lithium manganese fluoride phosphate (CA INDEX NAME)

Component	Ratio	Component Registry Number
F	x	14762-94-8
O4P	x	14265-44-2
Mn	x	7439-96-5
Li	x	7439-93-2

IC ICM H01M004-58
ICS C01B017-98; C01B025-10; C01B033-08
INCL 429231950; 429231900; 429221000; 429223000; 429224000; 429220000; 429231500; 429222000; 423332000; 423341000
CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 49
ST **battery electrode** alkali transition **metal halophosphate** hydroxy **phosphate**
IT **Battery** cathodes
Hydrothermal reactions
(alkali/transition metal halo- and hydroxy-phosphates and related **electrode** active materials)
IT Chalcogenides
Olivine-group minerals
Oxides (inorganic), uses
RL: DEV (Device component use); USES (Uses)
(alkali/transition metal halo- and hydroxy-phosphates and related **electrode** active materials)
IT Carbonaceous materials (technological products)
RL: MOA (Modifier or additive use); USES (Uses)

(alkali/transition metal halo- and hydroxy-phosphates and related **electrode** active materials)

IT Reduction
(carbothermal; alkali/transition metal halo- and hydroxy-phosphates and related **electrode** active materials)

IT Phosphates, uses
RL: DEV (Device component use); USES (Uses)
(halide; alkali/transition metal halo- and hydroxy-phosphates and related **electrode** active materials)

IT Secondary **batteries**
(lithium; alkali/transition metal halo- and hydroxy-phosphates and related **electrode** active materials)

IT Halides
RL: DEV (Device component use); USES (Uses)
(phosphates; alkali/transition metal halo- and hydroxy-phosphates and related **electrode** active materials)

IT 7440-44-0, Carbon, uses 7782-42-5, Graphite, uses 77641-62-4, Nasicon
RL: DEV (Device component use); USES (Uses)
(alkali/transition metal halo- and hydroxy-phosphates and related **electrode** active materials)

IT **52934-02-8P**, Cobalt lithium fluoride phosphate
52934-08-4P, Lithium nickel fluoride phosphate
257892-19-6P, Sodium vanadium fluoride phosphate (Na3V2F3(PO4)2)
477779-87-6P, Sodium vanadium fluoride phosphate NaVFPO4
477779-89-8P, Lithium sodium vanadiumfluoride phosphate (Li0.95Na0.05VF(PO4)) **484039-84-1P**, Cobalt lithium fluoride phosphate (CoLi2F(PO4)) **484039-86-3P**, Iron lithium fluoride phosphate (FeLi2F(PO4)) **484039-88-5P**
484039-91-0P, Lithium nickel fluoride phosphate (Li2NiF(PO4)) **484039-93-2P**, Iron lithium fluoride phosphate **484039-95-4P**, Lithium manganese fluoride phosphate (Li2MnF(PO4)) 484039-97-6P, Copper lithium fluoride phosphate (CuLi2F(PO4)) **484040-01-9P**, Iron lithium magnesium fluoride phosphate (Fe0.9Li1.25Mg0.1F0.25(PO4))
484040-04-2P, Sodium vanadium fluoride phosphate (Na1.2VF1.2(PO4))
484040-06-4P, Chromium sodium fluoride phosphate 484040-08-6P, Manganese sodium fluoride phosphate (MnNaF(PO4)) 484040-10-0P, Cobalt sodium fluoride phosphate (CoNaF(PO4)) 484040-12-2P, Lithium sodium vanadiumfluoride phosphate (Li0.1Na0.9VF(PO4))
484040-13-3P, Sodium vanadium hydroxide phosphate NaVOHPO4
484040-14-4P, Iron lithium fluoride phosphate (Fe2Li4F(PO4)3)) 484040-15-5P, Lithium vanadium fluoride phosphate (Li4V2F(PO4)3)) **484040-20-2P**, Lithium manganese fluoride phosphate (Li5Mn2F2(PO4)3) 484040-22-4P, Lithium vanadium fluoride phosphate (Li6V2F(PO4)3) 484040-25-7P, Chromium lithium sodium

fluoride phosphate silicate (CrLiNa0.2F(PO4)0.8(SiO4)0.2)
484040-27-9P **484040-28-0P** **493025-03-9P**,
Lithium manganese fluoride phosphate 493025-04-0P, Copper lithium
fluoride phosphate
RL: DEV (Device component use); SPN (Synthetic preparation); PREP
(Preparation); USES (Uses)
(alkali/transition metal halo- and hydroxy-phosphates and related
electrode active materials)

OSC.G 2 THERE ARE 2 CAPLUS RECORDS THAT CITE THIS RECORD (2 CITINGS)

RE.CNT 134 THERE ARE 134 CITED REFERENCES AVAILABLE FOR THIS RECORD
ALL CITATIONS AVAILABLE IN THE RE FORMAT

=>